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**XW4024-120/240-60**  
**XW4548-120/240-60**  
**XW6048-120/240-60**

## Installation Guide

# XW Power System

**XW Power Distribution Panel**  
**XW System Control Panel**  
**XW Solar Charge Controller**  
**XW Automatic Generator Start**

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# **XW Power System**

## **Installation Guide**

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975-0239-01-01

## **Product Numbers**

865-1000 (XW 6048-120/240-60)

865-1005 (XW4548-120/240-60)

865-1010 (XW4024-120/240-60)

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# About This Guide

## Purpose

The purpose of this Installation Guide is to provide explanations and procedures for installing the XW Power System.

## Scope

The Guide provides safety guidelines, detailed planning and procedures for installing the XW Inverter/Charger and related system components (the “XW Power System”). It does not provide details about configuration, operation, maintenance or troubleshooting. See the Operation Guide or Owner’s Manual of each device for this information. This Guide also does not provide details about particular brands of batteries. You need to consult individual battery manufacturers for this information.

## Audience

The Guide is intended for anyone who needs to install the XW Power System. Installers should be certified technicians or electricians.

## Organization

This guide is organized into four chapters and three appendices.

Chapter 1, “Introduction” lists and describes the components and basic features of the XW Power System.

Chapter 2, “Inverter/Charger Installation” describes how to mount and install the XW Inverter/Charger, and the XW Power Distribution Panel and XW Conduit Box.

Chapter 3, “Xanbus Network Installation” provides detailed information for planning and installing the components necessary for network communication on a Xanbus system.

Chapter 4, “XW Solar Charge Controller Installation” describes how to mount and connect the XW Charge Controller as part of the XW System.

Chapter 5, “XW System Accessories Installation” describes how to mount and install the XW System Control Panel and the Automatic Generator Start.

Appendix A, “Specifications” provides the electrical and environmental specifications for the XW Series.

Appendix B, “Wiring Diagrams” illustrate the most basic configurations and are for reference only. Specific installations may require additional equipment to meet national or local electric codes. Ensure all safety requirements are strictly followed.

Appendix C, “Alternate System Configurations” provides wiring diagrams for inverter/charger installations that do not require use of the power distribution panel and the XW Conduit Box.

## Conventions Used

The following conventions are used in this guide.



### **WARNING**

Warnings identify conditions or practices that could result in personal injury or loss of life.

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### **CAUTION**

Cautions identify conditions or practices that could result in damage to the XW Power System components or other equipment.

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## Related Information

Additional information about operating the XW Inverter/Charger, see the XW Inverter/Charger Operation Guide (975-0240-01-01).

For more information about related components, refer to:

- XW Power System Installation Overview (975-0238-01-01)
- XW System Control Panel Owner's Guide (975-0298-01-01)
- XW Solar Charge Controller Owner's Guide (975-0283-01-01)
- XW Automatic Generator Start Owner's Guide (975-0307-01-01)

These guides are available at [www.xantrex.com](http://www.xantrex.com). Printed copies should be included with the components.

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# Important Safety Instructions

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## WARNING

This chapter contains important safety and operating instructions as required by UL and CSA standards for inverters used in residential applications. **Read and keep this Installation Guide for future reference.**

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1. **Before using the inverter, read all instructions and cautionary markings on the unit, the batteries, and all appropriate sections of this manual.**
2. Use of accessories not recommended or sold by Xantrex Technology Inc. may result in a risk of fire, electric shock, or injury to persons.
3. The inverter is designed to be permanently connected to your AC and DC electrical systems. Xantrex recommends that all wiring be done by a certified technician or electrician to ensure adherence to the local and national electrical codes applicable in your jurisdiction.
4. To avoid a risk of fire and electric shock, make sure that existing wiring is in good condition and that wire is not undersized. Do not operate the inverter with damaged or substandard wiring.
5. Do not operate the inverter if it has been damaged in any way. If the unit is damaged, see the Warranty and Product Information section at the end of this manual.
6. This unit does not have any user-serviceable parts. Do not disassemble the inverter except where noted for connecting wiring and cabling. See the Warranty Section in the XW Inverter/Charger Operation Guide and other component manuals for instructions on obtaining service. Attempting to service the unit yourself may result in a risk of electrical shock or fire. Internal capacitors remain charged after all power is disconnected.
7. To reduce the risk of electrical shock, disconnect both AC and DC power from the inverter before attempting any maintenance or cleaning or working on any components connected to the inverter. Turning off controls will not reduce this risk.
8. The inverter must be provided with an equipment-grounding conductor connected to the AC input ground.
9. Do not expose this unit to rain, snow, or liquids of any type. This product is designed for indoor use only. Damp environments will significantly shorten the life of this product and corrosion caused by dampness will not be covered by the product warranty.
10. To reduce the chance of short-circuits, always use insulated tools when installing or working with this equipment.
11. Remove personal metal items such as rings, bracelets, necklaces, and watches when working with batteries.

## Limitations on Use



### **WARNING: Limitations on Use**

The XW Power System is not intended for use in connection with life support systems or other medical equipment or devices.

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## Explosive Gas Precautions

1. Working in the vicinity of lead acid batteries is dangerous. Batteries generate explosive gases during normal operation. Therefore, you must read this guide and follow the instructions exactly before installing or using your inverter/charger.
2. To reduce the risk of battery explosion, follow these instructions and those published by the battery manufacturer and the manufacturer of the equipment in which the battery is installed.

## FCC Information to the User

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment to a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.



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# 1

## Introduction

Chapter 1, “Introduction” lists and describes the components and basic features of the XW Power System.

| <b>For this Topic</b>               | <b>See....</b> |
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| “System Components and Accessories” | page 1–3       |

# System Overview

The XW Power System consists of several devices, components, and optional accessories that, when installed together, create a renewable energy power system that can be customized to suit nearly any application—off grid, grid tied, or backup. Up to three inverters can be installed in parallel to create larger 120/240 V 3-wire, single-phase systems allowing for increased capacity.

## System Diagram

### Dual-Inverter System with Renewable Energy (Solar)

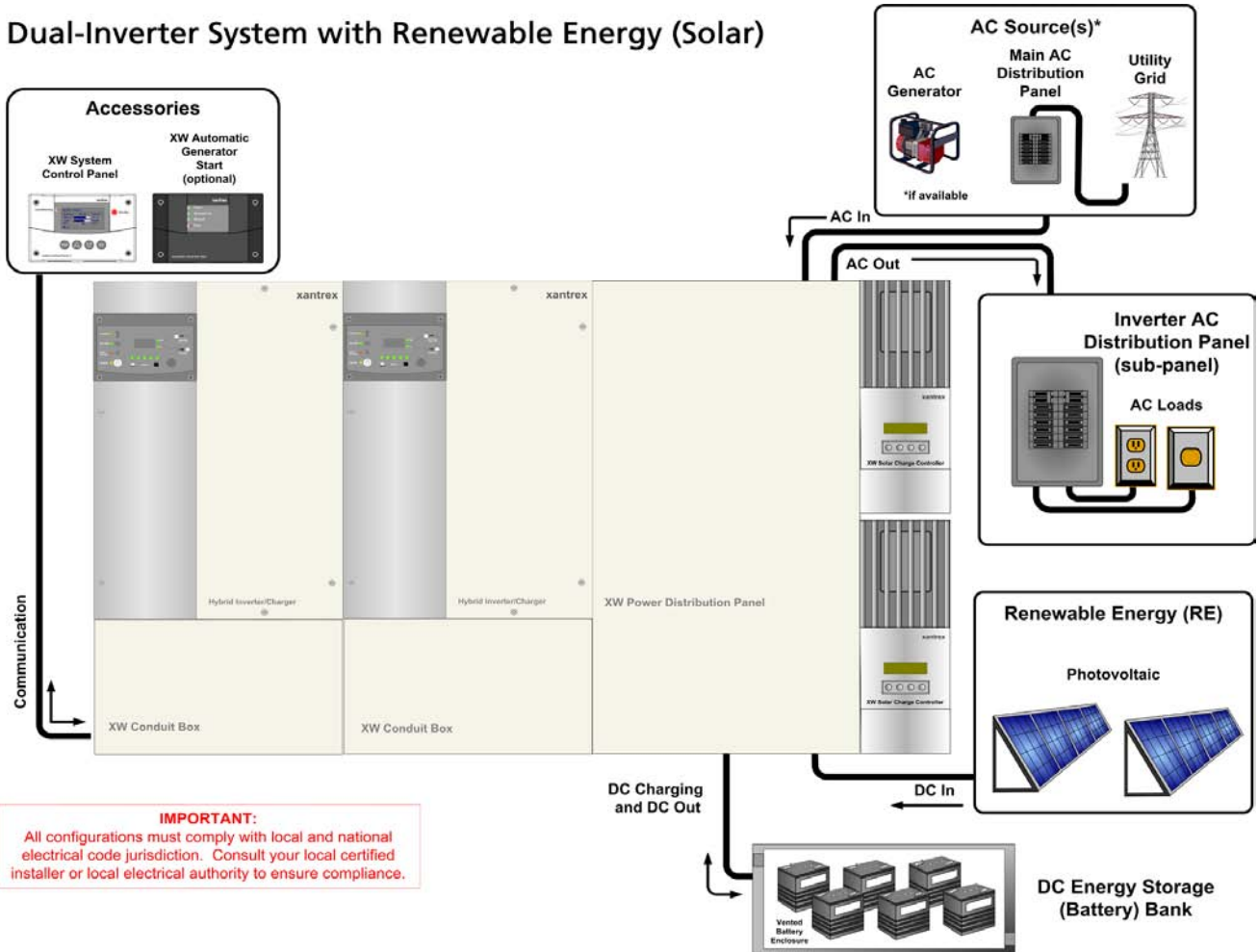


Figure 1-1 XW Power System Installation Diagram Example

# System Components and Accessories

## XW Inverter/Charger

The XW Inverter/Charger is a modular “building block” sine-wave inverter/charger that can be used for both residential and commercial stand-alone, grid-backup, and grid-tie applications with battery energy storage. The XW Series is a self-contained DC to AC inverter, battery charger, and AC transfer switch. Up to three inverters can be installed in parallel to create larger 120-240-volt, 3-wire, single-phase systems allowing for increased capacity.

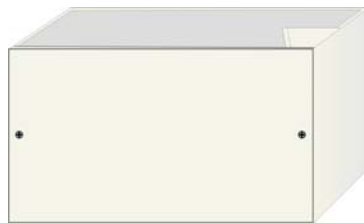


**Figure 1-2** XW Inverter/Charger

A Battery Temperature Sensor (FGA # 808-0232-02) is also included with the XW Inverter/Charger. The Battery Temperature Sensor monitors the temperature of the battery bank and adjusts the charging accordingly. See page 2–13 for installation instructions for this accessory.

## XW Conduit Box

A conduit box (FGA # 865-1025) is available to enclose the bottom of the XW Inverter/Charger and protect the cabling. Use of the conduit box may be required depending on the local electrical code. Be sure to consult with the local electrical authority to ensure the installation is code-compliant.



**Figure 1-3** XW Conduit Box

The XW Conduit Box comes in two pieces and mounts directly to the bottom of the inverter/charger with keyhole slots and screws. It is secured to the inverter by two #10-32 screws and is secured to the wall by two screws (not provided).

Internal wire barriers (or raceways) are included to keep communications wires separate from AC and DC power wires. The XW Conduit Box also includes multiple cable strap points.

## XW Power Distribution Panel Panel and XW Conduit Box

The XW Power Distribution Panel (FGA: 865-1015) includes a mounting plate and XW Conduit Box. It is factory wired and labelled with everything to support a code-compliant single-inverter installation. It is designed to mount on the right side of the inverter/charger, but it can also be configured to mount on the left side. Internal wiring and breakers can be added to expand the XW Power System with up to three inverters, four charge controllers, or other equipment to support 120/240-volt, 3-wire, single-phase systems.

The XW Power Distribution Panel and XW Conduit Box interface with:

- XW4024, XW4548, and XW6048 inverter/chargers
- XW Solar Charge Controllers (requires customer supplied breakers and wiring)
- C-Series Charge Controllers (requires customer supplied breakers and wiring).

Internal wire barriers (or raceways) are included to keep communications wires separate from AC and DC power wires.

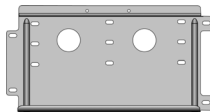
### XW Power Distribution Panel



### XW Power Distribution Panel includes:

- Power Distribution Panel enclosure with a field-reversible panel door
- Mounting Plate
- XW Conduit Box

### Mounting Plate



### XW Conduit Box



The enclosure comes pre-wired with:

- 3x 60A, 120/240 Vac, 2-pole, Square-D, Type QOU, DIN-rail mounted AC breakers (pre-wired to connect to one XW inverter)
- 1x GJ250A 160 Vdc, 3/8" stud DC breaker
- 1x Ground terminal bus bar
- 1x Neutral terminal bus bar
- 1 pair #4/0 AWG Battery Cables

The panel door can be mounted on the right or left side of the **XW Power Distribution Panel**.

AC Knockout slots = 8 (for dual 60A Square D, type QOU breakers)\*

DC Knockout slots = 8 small (for 60A DC breakers) and 3 large (for GJ breakers)

\*AC Breakers cannot exceed 60A.

### XW PDP Dimensions:

30" (761mm) H x 16" (406mm) W x 8 1/4" (210mm) D

Depth from the wall = 8 3/4" (223 mm)

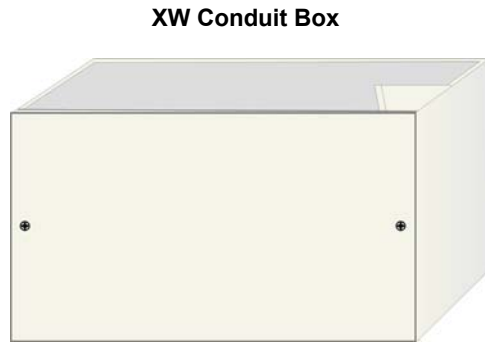
**Figure 1-4** Power Distribution Panel and XW Conduit Box

## XW Connection Kit for INV2

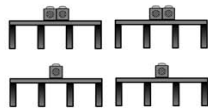
The XW Connection Kit for Inv2 (FGA # 865-1020) is the extension kit required for connecting a second or third XW Inverter/Charger in the same system.

**XW Connection Kit** includes:

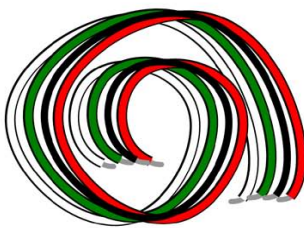
- XW Conduit Box with raceway barriers and cable strap connections points,
- 3x 60 A, 120/240 Vac, 2-pole, Square-D, Type QOU, Din-Rail mountable, AC breakers (includes bypass plate)
- #6 AWG AC wiring to connect the inverter to the AC breakers (includes 4 conduit bushings)
- 4x Power Distribution Bars (replaces factory-installed bars)
- 1x GJ250A 160 Vdc, 3/8" stud DC breaker
- 1x Bus Bar for DC positive
- 1 pair #4/0 AWG battery cables
- AC Sync and Xanbus cables (not shown)



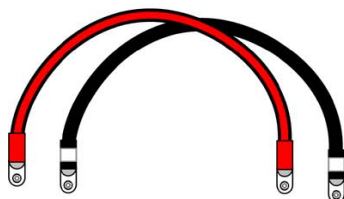
**Power Distribution Bars**



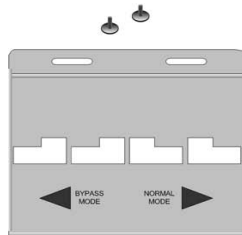
**#6 AWG AC Wiring**



**#4/0 AWG battery cables**



**AC Bypass Plate**



**GJ250A DC breaker**



**60A, 120/240Vac AC Breakers**



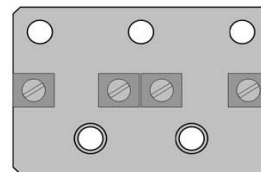
**15/16" bushing for AC sync and Xanbus knockouts**



**1-3/8" bushings for AC Wiring knockouts**



**DC Positive Bus Bar**



**Figure 1-5** XW Connection Kit for INV2

## XW Solar Charge Controller

The XW Solar Charge Controller (FGA # 865-1030) is a 60 amp charge controller with integrated PVGFP and separate Battery Temperature Sensor. The XW Solar Charge Controller can be used with 12-, 24-, 36-, 48-, and 60-volt DC battery systems. However, the XW Inverter/Charger can only work at 24 or 48 volts depending on the model. When the XW Solar Charge Controller is used with the XW Inverter/Charger, it is limited to 24- or 48-volt battery banks. The XW Solar Charge Controller will automatically detect the 24- or 48-volt settings.

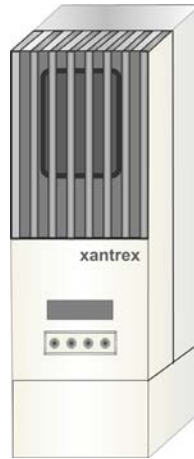
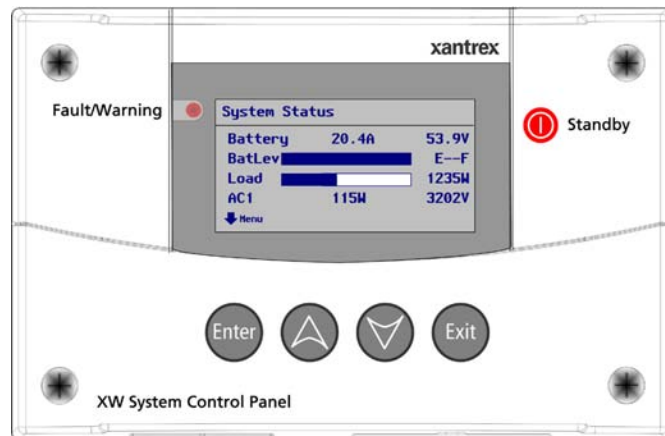


Figure 1-6 XW Solar Charge Controller

## XW System Control Panel

The XW System Control Panel features a graphical, backlit liquid crystal display that displays system configuration and diagnostic information for all devices connected to the network. When installed as an XW Power System accessory, the XW System Control Panel eliminates the need for separate control panels for each device and gives a single point of control to set up and monitor an entire XW Power System.



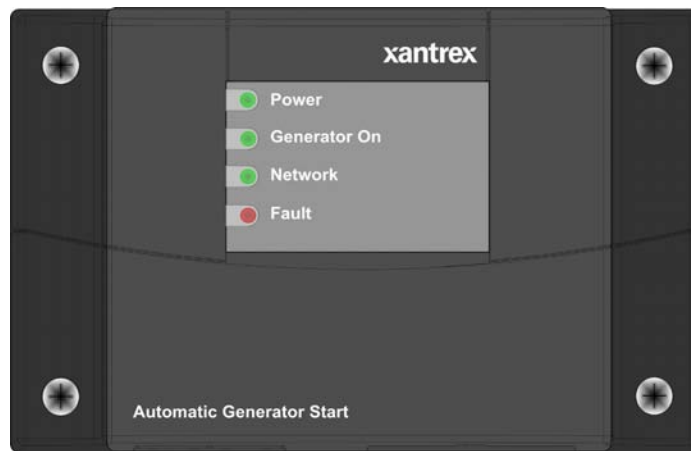
FGA Number:  
865-1050

Figure 1-7 XW System Control Panel

## XW Automatic Generator Start

The XW Automatic Generator Start can automatically activate a generator to provide an XW Series Inverter/Charger with power to recharge depleted batteries or assist with heavy loads. The XW Automatic Generator Start adds intelligence to power management and eliminates time spent monitoring batteries and inverter loads.

The XW Automatic Generator Start is compatible with popular generators, and can be configured to start the generator in response to low battery voltage, thermostat operation, or load size on the inverter battery. A quiet time setting prevents the generator from starting at inconvenient times. LEDs display the status of the XW Automatic Generator Start, while all user-defined settings are programmed through the XW System Control Panel.



FGA Number:  
865-1060

**Figure 1-8** Automatic Generator Start

### Generator

The generator should be a 120/240V, 2-wire or 3-wire generator with Auto Start capability.

**Important:** Do not use a 120-volt only generator. The inverter will not accept power from a generator of this kind.

The generator should also supply a Generator Run signal. This signal is used by the XW Automatic Generator Start to detect whether the generator is running. Some generator manufacturers refer to this signal as the Hour Meter Signal or Switched B+.

### Generator Compatibility

The XW Automatic Generator Start supports most two and three-wire generator starters. Some manufacturers include, but are not limited to, Onan (Quiet Diesel, gasoline, and LP), Power Tech, Generac, Northern Lights, Fisher Panda, Westerbeke, Kohler, Honda, and Yamaha. Check with the generator manufacturer to ensure the generator in question includes automatic starting capabilities.

### XW System Control Panel

A XW System Control Panel is required to configure the XW Automatic Generator Start and monitor generator starting and stopping activity.

The XW System Control Panel also provides real-time clock information for the XW Automatic Generator Start Quiet Time and Exercise Time features.





# 2

## Inverter/Charger Installation

Chapter 2, “Inverter/Charger Installation” describes how to mount and install the XW Inverter/Charger, and the XW Power Distribution Panel and XW Conduit Box.

| <b>For this Topic</b>   | <b>See....</b> |
|---|----------------|
| “Pre-Installation”  | page 2–2       |
| “Step 1: Installing the Mounting Plate”                               | page 2–4       |
| “Step 2: Mounting the Inverter”                                       | page 2–6       |
| “Step 3: Mounting the XW Power Distribution Panel and XW Conduit Box” | page 2–7       |
| “Step 4: Wiring the Inverter”   | page 2–8       |
| “Step 5: Installing Additional Inverters”                             | page 2–29      |

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## Pre-Installation

Before installing the XW Inverter/Charger, read all instructions and cautionary markings located in this manual.

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**Important:** Be sure to obtain the appropriate permits, if necessary, prior to starting this installation. *Installations must meet all local codes and standards.* Installations of this equipment should only be performed by skilled personnel such as qualified electricians and Certified Renewable Energy (RE) System installers.

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### **WARNING: Personal Injury**

The XW Inverter/Charger weighs approximately 120 pounds (54 kg). To prevent personal injury, always use proper lifting techniques and have someone available to assist with lifting during installation.

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## Location

Close to battery bank

The XW Inverter/Charger is certified for indoor (heated or unheated) installations only. Locate the inverter as close to the batteries as possible in order to keep the battery cable length short. The maximum recommended battery cable length is 10 feet (3 m).

---



### **WARNING: Explosion and Corrosion Hazard**

Do not locate the inverter directly above the batteries or in the same compartment as vented batteries.

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Fire safety

Locate any electronic equipment susceptible to radio frequency and electromagnetic interference as far away from the inverter as possible.

Do not locate the inverter near readily flammable materials such as cloth, paper, straw, or plastic sheeting. Flammable materials should be kept a minimum distance of 24 inches (60 cm) from the top surface and 12 inches (30 cm) from either side surface and the front of the XW Inverter/Charger.

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## Knockout Preparation

Remove your choice of knockouts from the chassis to facilitate conduit installation for wire runs. Ensure no debris from this procedure remains inside the inverter enclosure.

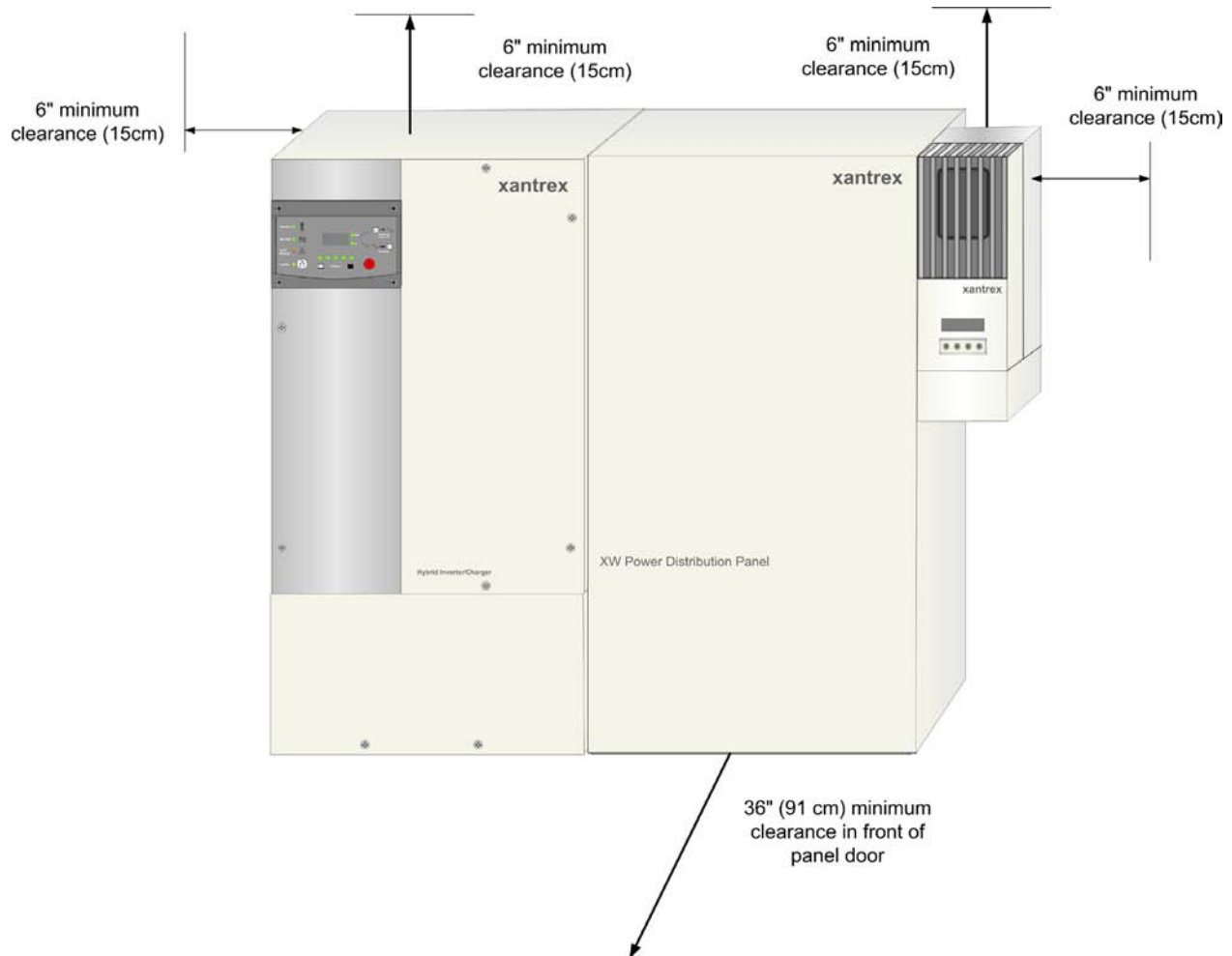
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**Important:** Do not drill, cut, or punch holes into the XW power distribution Panel. Use only the knockouts provided for conduit entry.

---

## Clearance Requirements

Provide a minimum clearance of 6 inches (15 cm)—12 inches is preferred—around the top and 6 inches (15 cm) at the bottom of the inverter for ventilation. There must be at least three feet of clearance in front of the inverter. Ensure that the vents are not obstructed with foreign objects and that the minimum clearances are met.



**Figure 2-1** Clearance Requirements

## Mounting

The XW Power System is designed to be mounted on a vertical surface. The supporting surface must be strong enough to support a minimum of 500 pounds (227 kg). To facilitate installation, a wall mounting plate (Xantrex p/n 210-0462-01-01) is provided for each XW Inverter/Charger and XW Power Distribution Panel. The mounting plate and hardware on the XW Inverter/Charger and XW Power Distribution Panel are designed to meet standards for structural and seismic stability. When properly installed, the system also meets Section 59 of UL 1741 for Static Loads.

## Step 1: Installing the Mounting Plate

Each XW Inverter/Charger and XW Power Distribution Panel requires a separate mounting plate. This bracket is first attached to the wall, then the inverter/charger or distribution panel is attached to the wall bracket.

The wall bracket is attached to the wall with lag bolts or other fasteners, provided by the installer. A minimum of four 1/4-inch diameter fasteners are required. The fasteners must be sufficiently strong to support 500 pounds.

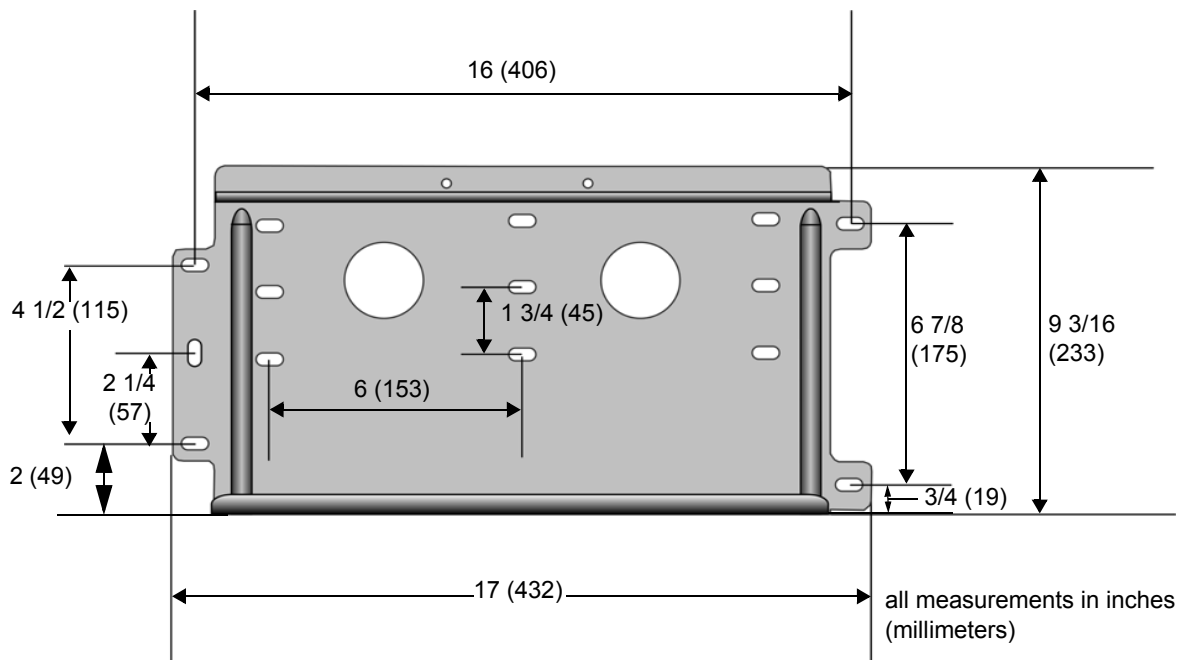
The wall bracket has mounting holes spaced 16 inches (40 cm) apart and is designed to span two wall studs spaced 16 inches on-center. Additional mounting holes are also provided for flexibility in mounting options. If the wall does not have 16-inch on-center studs, the installer will need to provide adequate supports for the brackets. For example, a sheet of plywood can be attached to the wall, and the wall brackets can then be attached to plywood.

Both the XW Inverter/Charger and XW Power Distribution Panel use the same wall bracket. The brackets are designed to interlock (as shown in Figure 2-3), so that additional mounting plates are easily installed without additional measuring or levelling.

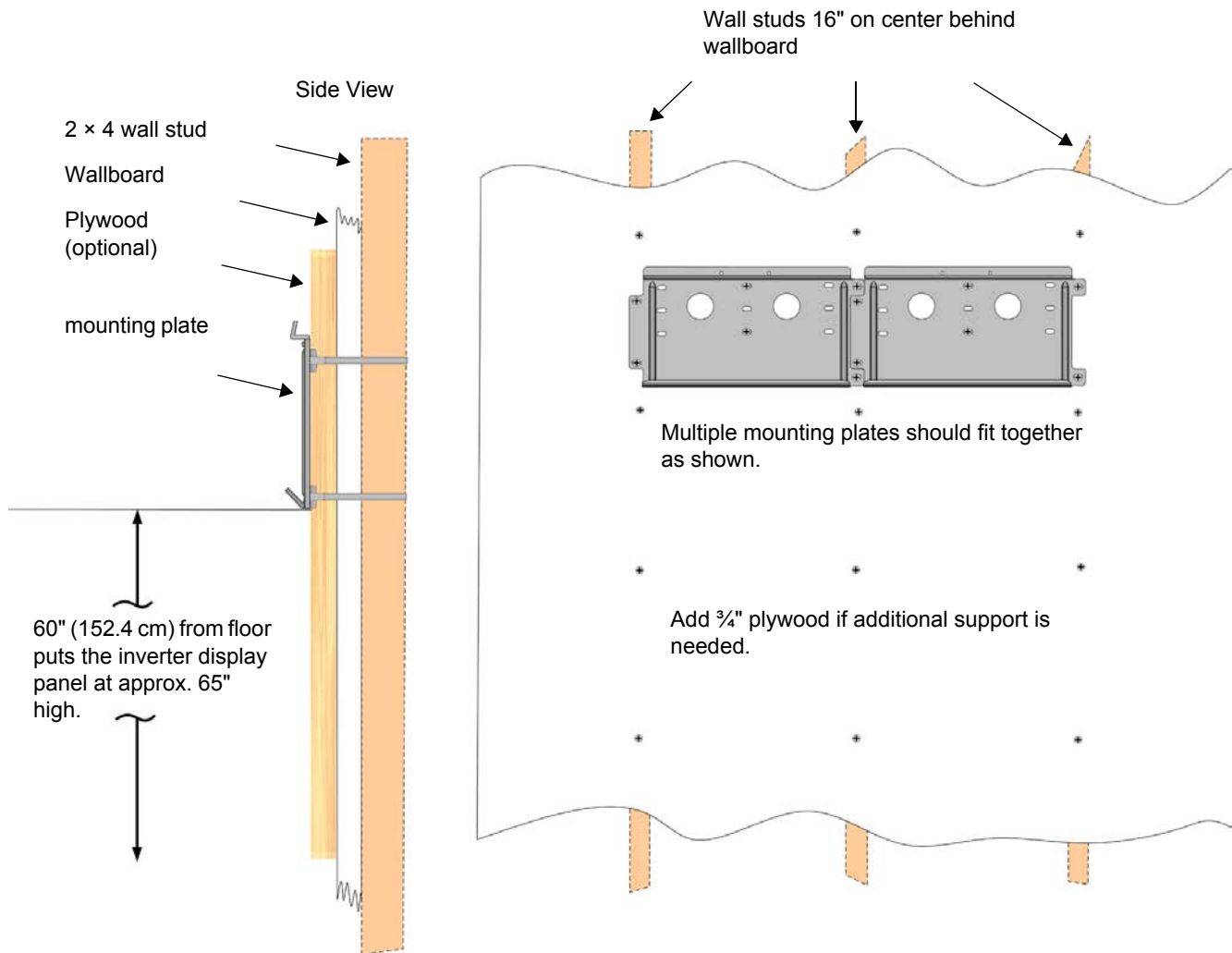
The type of fastener required to secure the mounting plate varies according to the vertical surface and wall structure of your installation location.

**Table 2-1 Mounting Plate Fastener Recommendations**

| Structure  | Required Fastener              | Number of Screws Per Bracket |
|--|--------------------------------|------------------------------|
| Wood studs at 16" (on center - O.C.)                             | 1/4" Ø × 3 1/2" long lag screw | Four                         |
| Wood studs not at 16" O.C. (3/4" minimum plywood panel required) | 1/4" Ø × 1" long wood screw    | Six                          |
| Steel studs at 16" O.C. (minimum 18 gauge)                       | 1/4" Ø self-drilling screw     | Four                         |



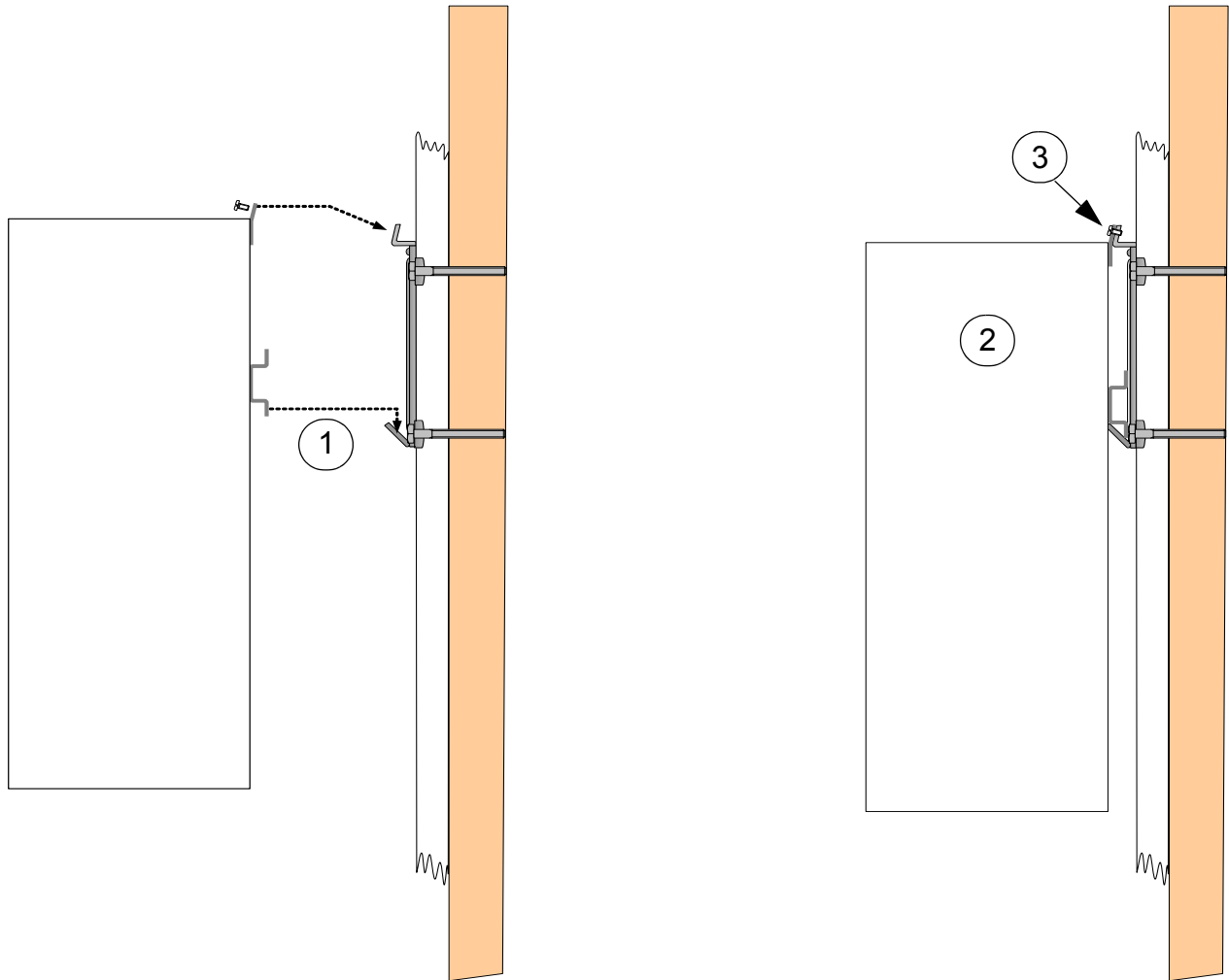
**Figure 2-2 Mounting Plate Dimensions**



- 1 Locate the wall studs.
- 2 If necessary, enhance the support surface with a 3/4" plywood panel secured to the wall studs. Plywood should span at least three wall studs.
- 3 Use hardware sized to support a minimum of 500 lbs (not provided) to secure the plywood to the wall.
- 4 Using a level, secure the first mounting bracket to the wall. Use recommended anchoring hardware to secure the plate (see Table 2-1).
- 5 Mount the next bracket adjacent to the first one. The brackets are designed to interlock, so additional mounting brackets are easily installed without additional measuring or levelling.

**Figure 2-3** Mounting the Bracket for the XW Inverter/Charger or Distribution Panel

## Step 2: Mounting the Inverter



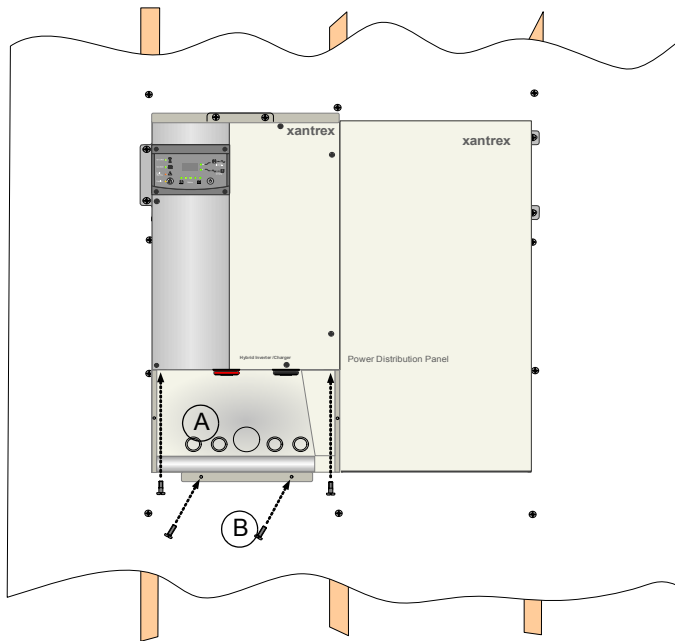
- ① Align the flange on the back of the XW Inverter/Charger with the bottom edge of the mounting plate.
- ② Lower the flange on the inverter onto the mounting plate.  
**CAUTION:** Before releasing the full weight of the unit, ensure the inverter is seated properly on the mounting plate.
- ③ Secure the top of inverter with two #10 self-tapping screws (supplied).

Figure 2-4 Mounting the XW Inverter/Charger

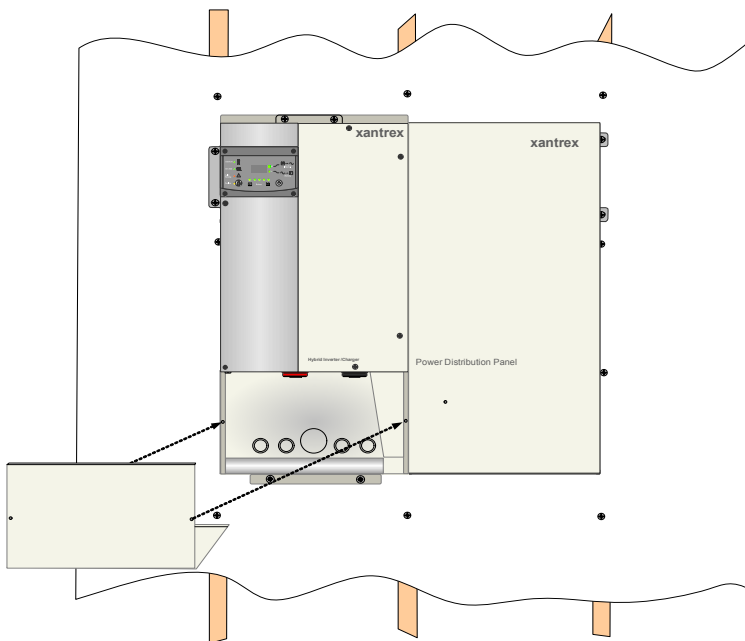
## Step 3: Mounting the XW Power Distribution Panel and XW Conduit Box

Mount the XW Distribution Panel on the mounting bracket following the same procedure in Step 2.

When mounting the XW Conduit Box as shown in Figure 2-5, it is not necessary to attach the front panel until all wiring is complete.



- 1 Attach the back panel of the XW Conduit Box to the bottom of the inverter with two screws through the keyhole slots under the back panel top and the corresponding holes in the bottom of the inverter (A). Secure the bottom edge of the back panel to the wall using two screws (B).



- 2 Attach the front panel of the XW Conduit Box by sliding the bottom lip of the front panel over the lower edge of the back panel. Align the two holes in the front panel with the two holes in the back panel. Use the two #10-32 screws provided to secure the front panel to the back panel.

Figure 2-5 Installing the XW Conduit Box

## Step 4: Wiring the Inverter

This section provides procedures for making AC and DC connections between the XW Inverter/Charger and the power distribution panel using the cables that are pre-installed in the distribution panel. This section also assumes that the XW Conduit Box was installed in the previous section.

For diagrams and information about installing the inverter/charger without the XW Conduit Box and XW Power Distribution Panel, see Appendix C.

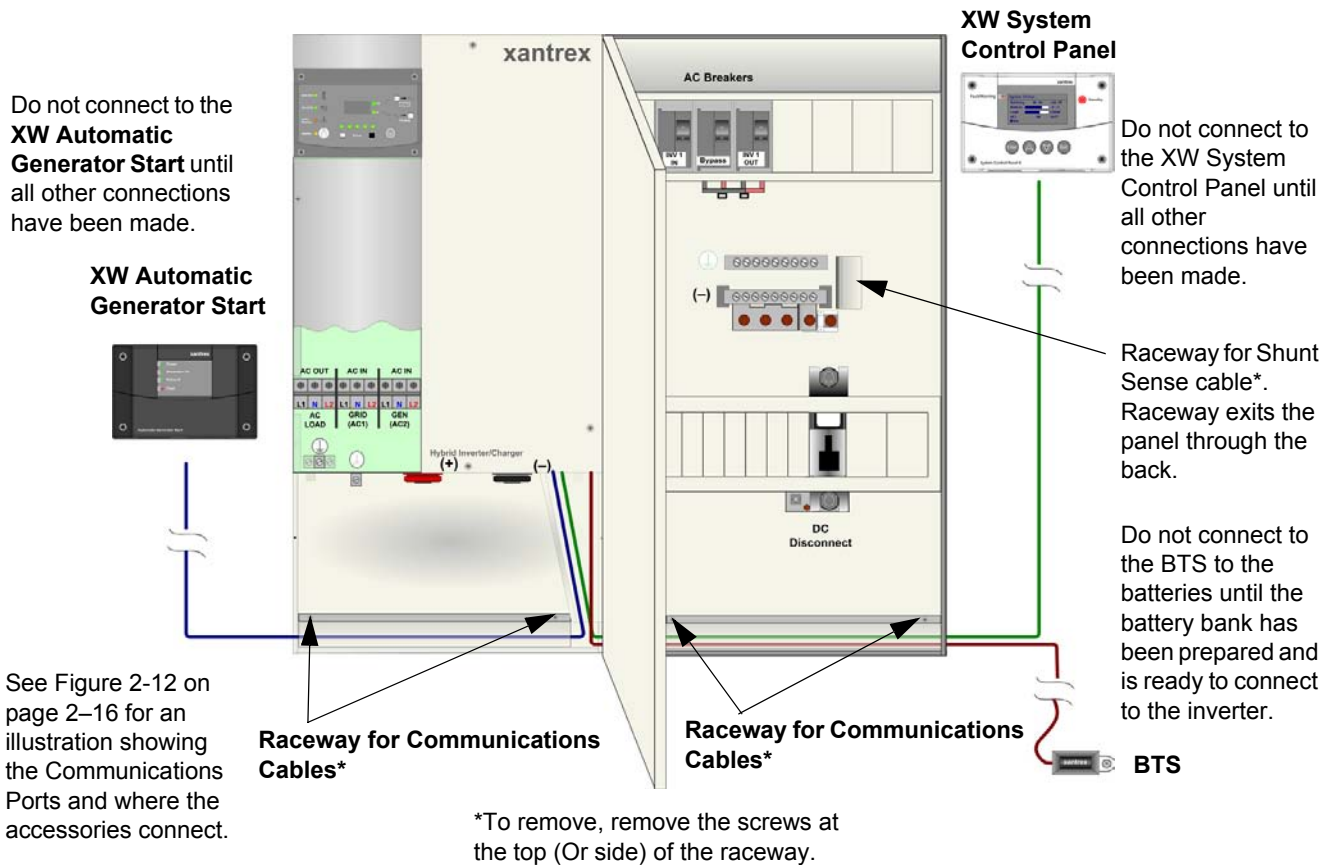
**Important:** Communication and signal cables must be segregated from all DC and AC wiring. Therefore, a small raceway has been included in the design of both the XW Power Distribution Panel and the XW Conduit Box to separate the communications cables from the power cables. This is a small raceway run built into the bottom of both the XW Power Distribution Panel and the XW Conduit Box and is held in place by a single screw at the top of the raceway.

**Installation Tip**

Before making the AC or DC cable connections, route the communications cables through the raceway, but do not connect them to their components until after all the inverter connections are made. Once the AC and DC connections are made the run becomes difficult to access. Use different colors for the communications cables (or cable tags) to help make them easier to identify.

Route the communications cables for any accessories being installed BEFORE making AC or DC Connections.

**IMPORTANT:** When routing communications cables through the XW Power Distribution Panel, the raceway conduit must be used to keep the communications cables separate from the power cables.



**Figure 2-6** Routing Communications Cables



## Batteries

See the FAQs section of the Xantrex Web site for information on determining battery bank requirements.

Consider the following recommendations for battery use.

- Use only the deep discharge types for inverter applications.
- Use the same battery type for all batteries in the bank.
- Use only batteries from the same lot and date in your battery bank. This information is usually printed on a label located on the battery.



### CAUTION: Damage to Equipment

The XW Inverter/Charger is intended to operate with batteries as its source of DC power. **Do not** connect DC power sources, such as PV arrays, wind turbines, or micro-hydro turbines, directly to the XW Inverter/Charger without a battery. Connect DC power sources to a charge controller such as the XW Solar Charge Controller instead. If DC power sources are connected directly to the inverter, the DC rating of the inverter can be exceeded and the inverter can be damaged.

## Battery Bank Requirements

The DC voltage of the inverter must match the nominal voltage of the system and all battery-connected devices. If the inverter is a 24-volt inverter, then the battery bank and all battery-connected devices in the system need to be configured for 24 volts.

**Important:** The minimum recommended battery bank is 100 Ah. The inverter is designed to operate with batteries and should not be operated without them. Also, do not allow the battery bank to become completely discharged. If the voltage of the battery bank falls below 10 volts, the XW Power System will not operate.

## Battery Cable Requirements



### WARNING: Fire Hazard

Undersized cables can overheat and melt, creating a fire hazard when subjected to heavy (peak) loads. Always use a cable of proper size and length, rated for the amperage of the inverter and batteries.

**Important:** Use only fine-stranded copper cables for battery and inverter DC connections. Do not use coarse-stranded wire, as the lack of flexibility may damage battery and inverter terminals.

|                        |   |
|------------------------|---|
| Battery cable length   | Runs should be kept as short as practical. Length should not exceed 10 feet (3 m). For best performance, the positive and negative cables should run alongside each other. Avoid cable loops.   |
| Battery cable lugs     | Battery cables must have crimped copper compression lugs or crimped and soldered copper compression lugs. Soldered connections alone are not acceptable. Lugs must be rated for use with fine-stranded cable.   |
| Overcurrent protection | For safety and compliance with regulations, battery overcurrent protection is required. Fuses and disconnects must be sized to protect the wiring in the system and are required to open before the wire reaches its maximum current carrying capability. |

Terminal covers

Color-coded snap-on DC terminal covers are provided to prevent accidental contact with the terminals. Terminal covers are required for all installations, even if a XW Conduit Box is used. It is also recommended that the shank of the ring terminals (cable lugs) be covered with heat shrink or some other form of insulation.

**Table 2-2** Recommended Battery Cable Size Versus Length

| Inverter Model | Up to 5 Feet (1.5 m) (90°C wire) | Up to 10 Feet (3 m) (90°C wire) |
|----------------|----------------------------------|---------------------------------|
| XW4024         | #4/0 AWG (120 mm <sup>2</sup> )  | #4/0 AWG (120 mm <sup>2</sup> ) |
| XW4548         | #2/0 AWG (70 mm <sup>2</sup> )   | #4/0 AWG (120 mm <sup>2</sup> ) |
| XW6048         | #4/0 AWG (120 mm <sup>2</sup> )  | #4/0 AWG (120 mm <sup>2</sup> ) |

**Important:** The NEC/CEC requires both overcurrent protection and a disconnect switch for residential and commercial electrical systems. These items are not supplied as part of the inverter, but are included in the XW Power Distribution Panel.

**Table 2-3** Battery Cable (in conduit) to Maximum Breaker/Fuse Size

| Cable Size Required | Maximum Breaker/Fuse Size |
|---------------------|---------------------------|
| #2/0 (00) AWG       | 175 amps                  |
| #4/0 (0000) AWG     | 250 amps                  |

**Torque Values for the XW Series Inverter/Charger**

**Table 2-4** Torque Values for AC Wiring (AC Terminals and Ground Bar)

| Wire Size<br>AWG | Torque Value |     |
|------------------|--------------|-----|
|                  | In-lb        | N-m |
| 14–10            | 35           | 4   |
| 8                | 40           | 4.5 |
| 6–4              | 45           | 5   |

**Table 2-5** Torque Values for the Chassis Ground Lug

| Wire Size<br>AWG | Torque Value |     |
|------------------|--------------|-----|
|                  | In-lbs       | N-m |
| 6-4              | 45           | 5.1 |
| 3-2              | 50           | 5.6 |

**Table 2-6** Torque Values for the Inverter Battery Terminals

| Torque Value |      |
|--------------|------|
| Ft-lbs       | N-m  |
| 15           | 20.4 |

## Torque Values for the XW Power Distribution Panel

**Table 2-7** Torque Values for AC Disconnects and AC Breakers

| Wire Size | Torque Value |     |
|-----------|--------------|-----|
|           | In-lb        | N-m |
| 16–10     | 45           | 5   |
| 8         | 45           | 5   |
| 6–4       | 45           | 5   |

**Table 2-8** Torque Values for the Ground Bus, AC Neutral Bus, DC Negative Bus, and DC Positive Bus in the XW Power Distribution Panel

| Wire Size | Torque Value |     |
|-----------|--------------|-----|
|           | In-lbs       | N-m |
| 14 - 10   | 35           | 4.0 |
| 8         | 40           | 4.5 |
| 6 - 4     | 45           | 5.1 |
| 3 - 2/0   | 50           | 5.6 |

**Table 2-9** Torque Values for the Power Distribution Bars in the XW Power Distribution Panel

| Wire Size | Torque Value |     |
|-----------|--------------|-----|
|           | In-lbs       | N-m |
| 14 - 10   | 35           | 4.0 |
| 8         | 40           | 4.5 |
| 6 - 4     | 45           | 5.1 |
| 3 - 2/0   | 50           | 5.6 |

**Table 2-10** Torque Values for the Battery Cables to the DC Negative Bus, and DC Positive Bus in the XW Power Distribution Panel

| Torque Value |      |
|--------------|------|
| Ft-lbs       | N-m  |
| 15           | 20.4 |

## Inverter Grounding

**Important:** The grounding requirements vary by country and by application. All installations must comply with national and local codes. Consult local and national codes for specific grounding and bonding requirements for the desired installation.

## Backfeed Protection Requirements

**Important:** Installers must make allowance for the amount of power that can be fed into a distribution panel and the means and location for feed-in, in accordance with NEC 2005 article 690.64 or similar requirements of the local electrical code.

## Wiring the Inverter to the XW Power Distribution Panel

**Important:** If a XW Conduit Box is installed, communication and Battery Temperature Sensor cables must run through the raceway at the rear of the XW Conduit Box. Before making AC and DC connections, route all communication and Battery Temperature Sensor cables through the raceways. The raceways becomes more difficult to access after all AC and DC wiring is completed.

### Grounding the DC System

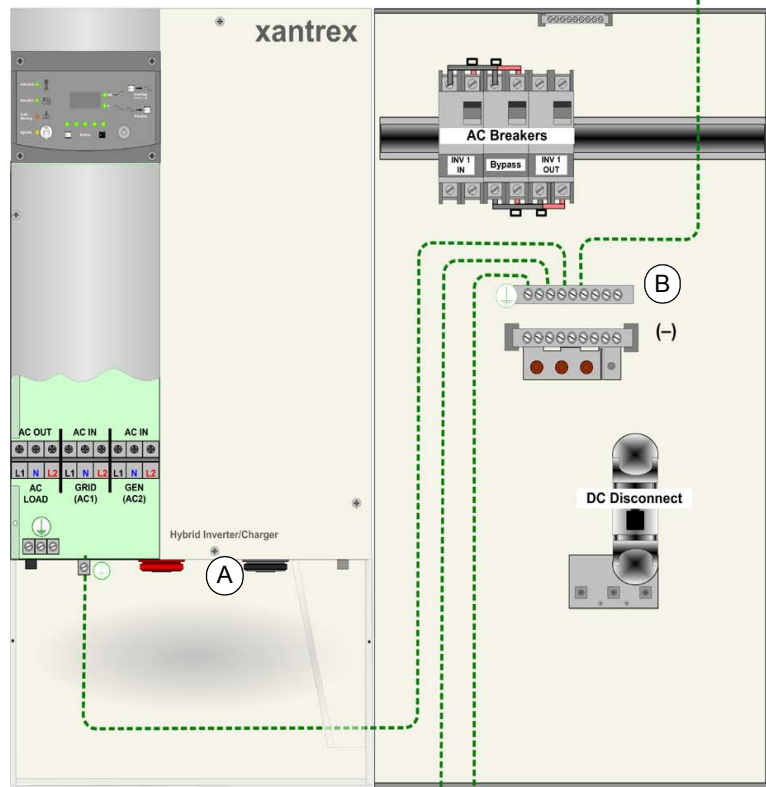
The inverter's chassis ground bar (see Figure 2-7) is used to connect the chassis of the inverter to the DC grounding system. The terminal accepts wires from #14 AWG to #2 AWG.

(A)

See Table 2-5 on page 2-10 for torque values for the AC Chassis Ground.

Renewable Energy (RE)

Photovoltaic



(B)

See Table 2-6 on page 2-10 for torque values for the Ground bar in the XW Power Distribution Panel.

Actual ground requirements may vary.

Primary System Ground

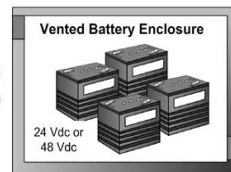


Figure 2-7 DC Grounding Using a Power Distribution Panel

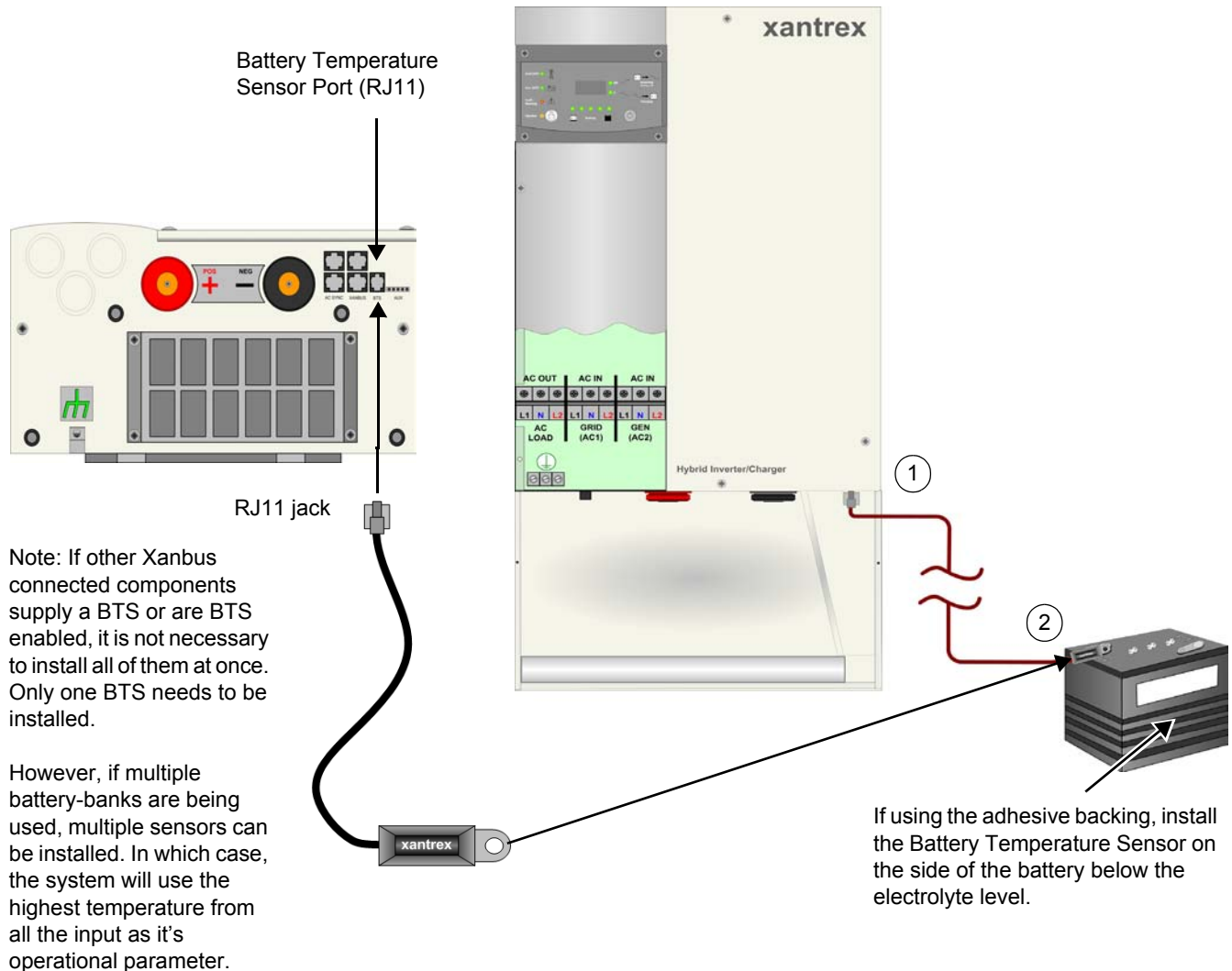
## Installing the Battery Temperature Sensor

The Battery Temperature Sensor (BTS) port is for connecting to the Battery Temperature Sensor, which regulates battery charging based on battery temperature. Installing a sensor extends battery life by preventing overcharging in warm temperatures and undercharging in cold temperatures. This port is also considered part of the DC interface (see Figure 2-9).

### To install the Battery Temperature Sensor:

1. Pass the end of the Battery Temperature Sensor cable through a conduit hole and insert the Battery Temperature Sensor plug into the Battery Temperature Sensor port.
2. Route the cable to the battery enclosure and connect the ring terminal on the Battery Temperature Sensor directly to a battery terminal (recommended), or use the adhesive backing on the sensor back to attach the sensor to any side of the battery to be monitored.

If using the adhesive backing, install the Battery Temperature Sensor on the side of the battery below the electrolyte level. It is best to place the sensor between batteries and place the batteries in an insulated box to reduce the influence of the ambient temperature outside the battery enclosure.



**Figure 2-8** Battery Temperature Sensor (RJ11) Port Location and Installation

## Making DC Connections

This section describes how to make DC connections between the inverter/charger and the power distribution panel (using the pre-installed DC cables in the distribution panel), between the distribution panel to the batteries (using battery cables provided by the installer—see Table 2-2 on page 2-10). This section also provides procedures for installing the battery temperature sensor. See Appendix C, “Alternate System Configurations” if the installation will not be including an XW Power Distribution Panel.



### WARNING: Shock Hazard

Ensure that all AC and DC breakers are switched OFF before connecting or disconnecting the battery cables and that all sources of power (both AC and DC) are disconnected from the inverter.

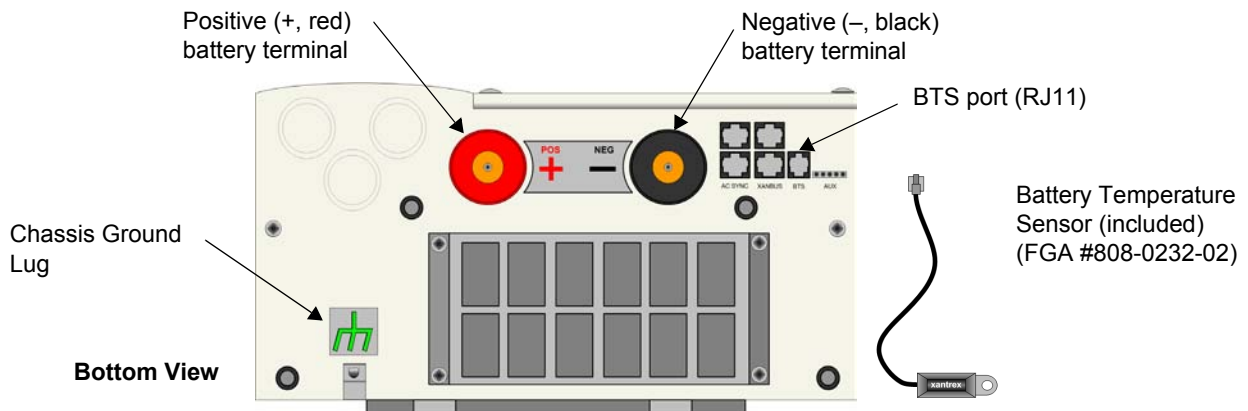


Figure 2-9 XW Inverter/Charger DC Connections

#### To connect the XW Power Distribution Panel to the inverter:

1. Connect the pre-installed DC cables from the XW Power Distribution Panel to the inverter DC terminals. Figure 2-10 shows the proper stacking order of hardware. Be careful to observe proper polarity.
2. Attach the DC terminal covers.
3. Route the DC cables from the battery—with the cables not connected to the battery—and connect them to the XW Power Distribution Panel: negative to negative bus, positive to the input end of the DC breaker. To properly attach and torque the positive cable to the DC breaker, you may need to temporarily remove the breaker from the rail.
4. Perform the procedures in “Making AC Connections” before connecting the DC cables from the XW Power Distribution Panel to the battery.

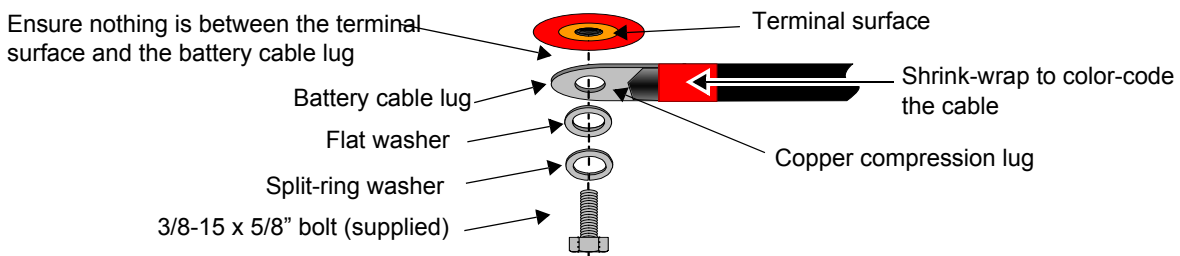


Figure 2-10 Battery Cable Connection



**CAUTION: Damage to Equipment**

Do not put anything between the battery cable lug and the terminal surface. Overheating of the terminal may occur. Do not apply any type of antioxidant paste until after the battery cable wiring is tightened. The same applies for all DC connections. Do not over-tighten; observe all recommended torque values.

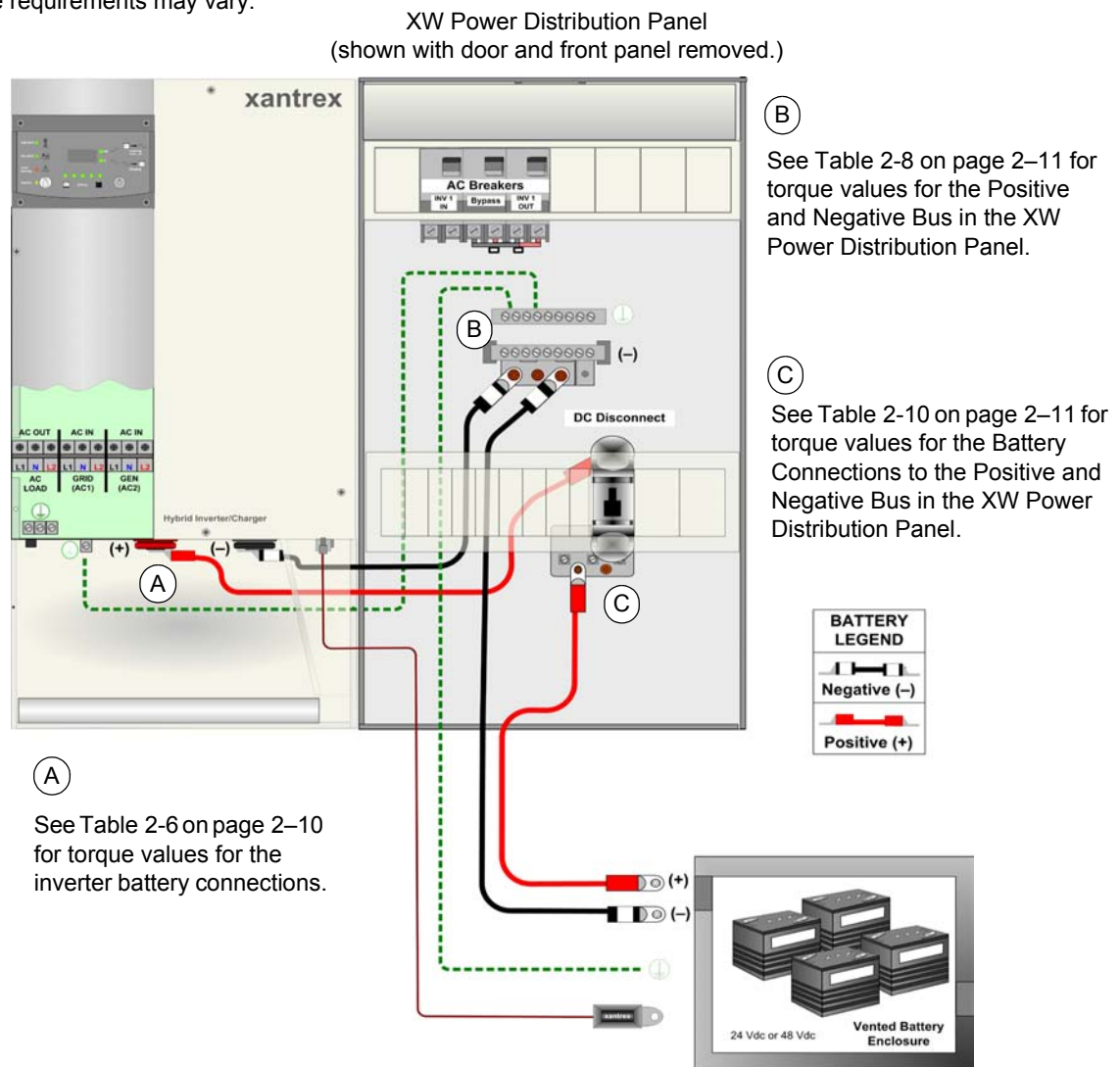


**CAUTION: Reverse Polarity Damage**

Before making the final DC connection or closing the DC breaker or disconnect, check cable polarity at both the battery and the inverter/charger. Positive (+) must be connected to positive (+). Negative (-) must be connected to negative (-).

Reverse polarity damage is not covered by warranty.

Actual cable requirements may vary.



Torque connections to the battery terminals according to the battery manufacturer's recommendations.

**Figure 2-11** DC Connections to a Single Inverter Using a XW Power Distribution Panel

## Making AC Connections

This section describes how to make AC connections between the XW Inverter/Charger and the XW Power Distribution Panel (using the pre-installed AC wiring in the XW Power Distribution Panel) and between the XW Power Distribution Panel and the AC distribution panel, or sub-panel (using wiring provided by the installer). See Appendix C, “Alternate System Configurations” if the installation will not be including an XW Power Distribution Panel.



### CAUTION: Damage to the Inverter

The inverter’s AC output must never be wired to the utility or generator output. This will cause severe damage to the inverter which is not covered under warranty.

Do not use a GFCI equipped AC source to power either the grid or generator inputs. The AC input filters on the XW may cause nuisance tripping of ground fault protected outputs.

## AC Connections and Communication Ports

**AC Connections** The AC terminal block includes three terminals each (L1, L2 and Neutral) for AC Grid input, AC Generator input, and AC Load connections. The neutrals are connected to each other, requiring only one neutral connection when installed with an XW Power Distribution Panel. Without the XW Power Distribution Panel, additional neutral connections may be required at the input sources.

**Communication Ports** Four communications ports and one AUX Port are located on the bottom of the inverter and support the following features.

- The two AC sync ports are used for connecting multiple inverters in parallel.
- The two Xanbus ports are used for network connections between inverters, charge controllers, and accessories.
- The AUX port provides 12 Vdc/250 mA output to control a relay, fan, indicator light or other device. The auxiliary output can be configured (using a XW System Control Panel) to trigger in response to low- or high-battery voltage or high- or low-battery temperature. The auxiliary output can also be triggered manually using a XW System Control Panel.

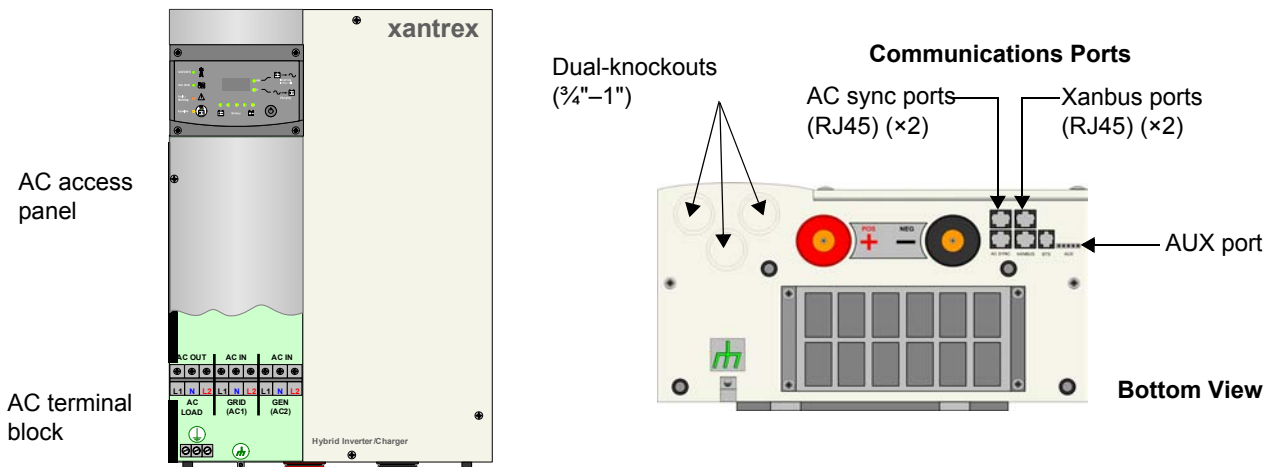
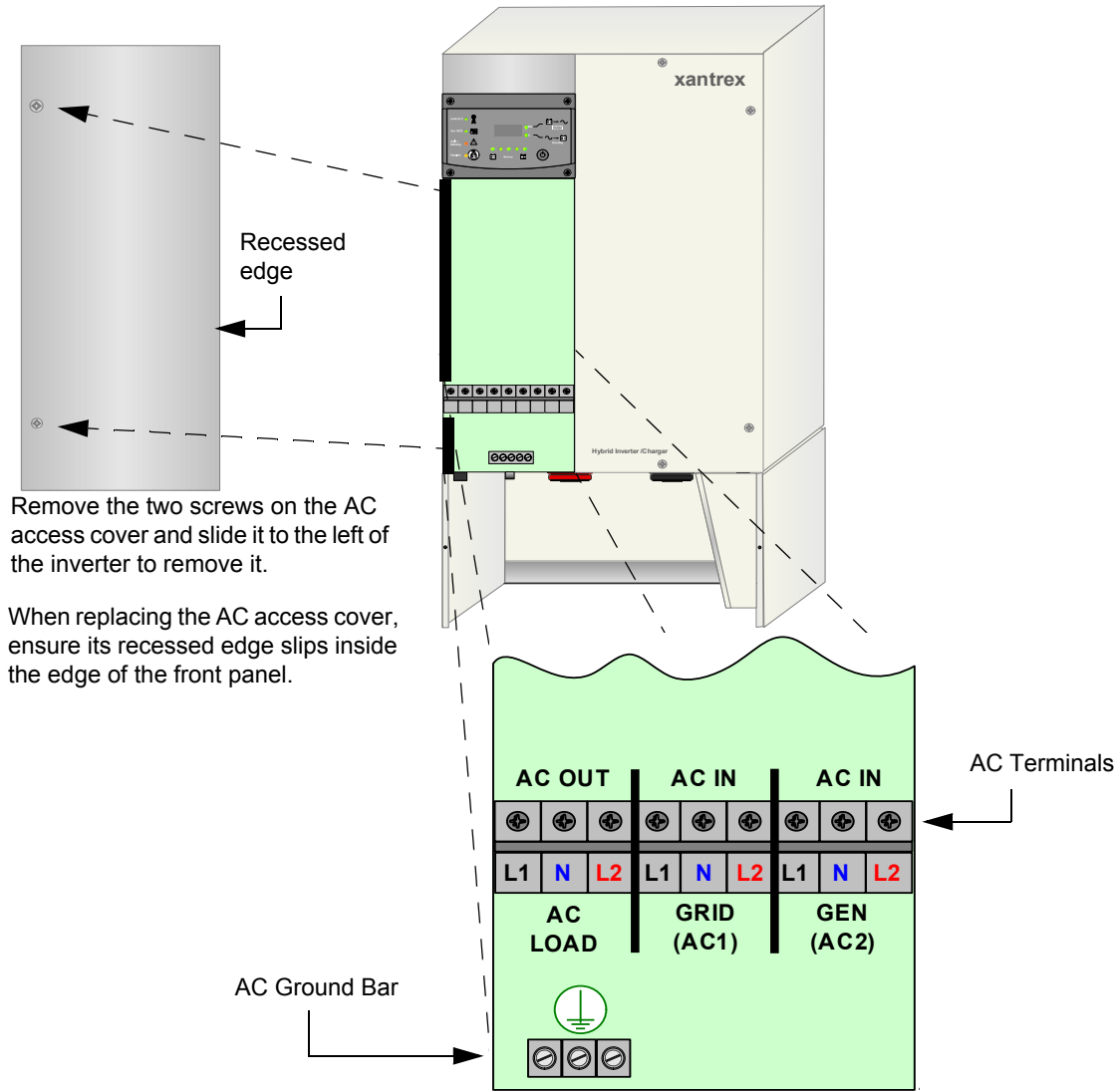


Figure 2-12 XW Inverter/Charger AC Connections and Communications Ports



### Accessing the AC Terminal Block and AC Ground Bar

All AC wiring connects to the AC terminal block located on the left-hand side of the inverter beneath the AC access cover.



Remove the two screws on the AC access cover and slide it to the left of the inverter to remove it.

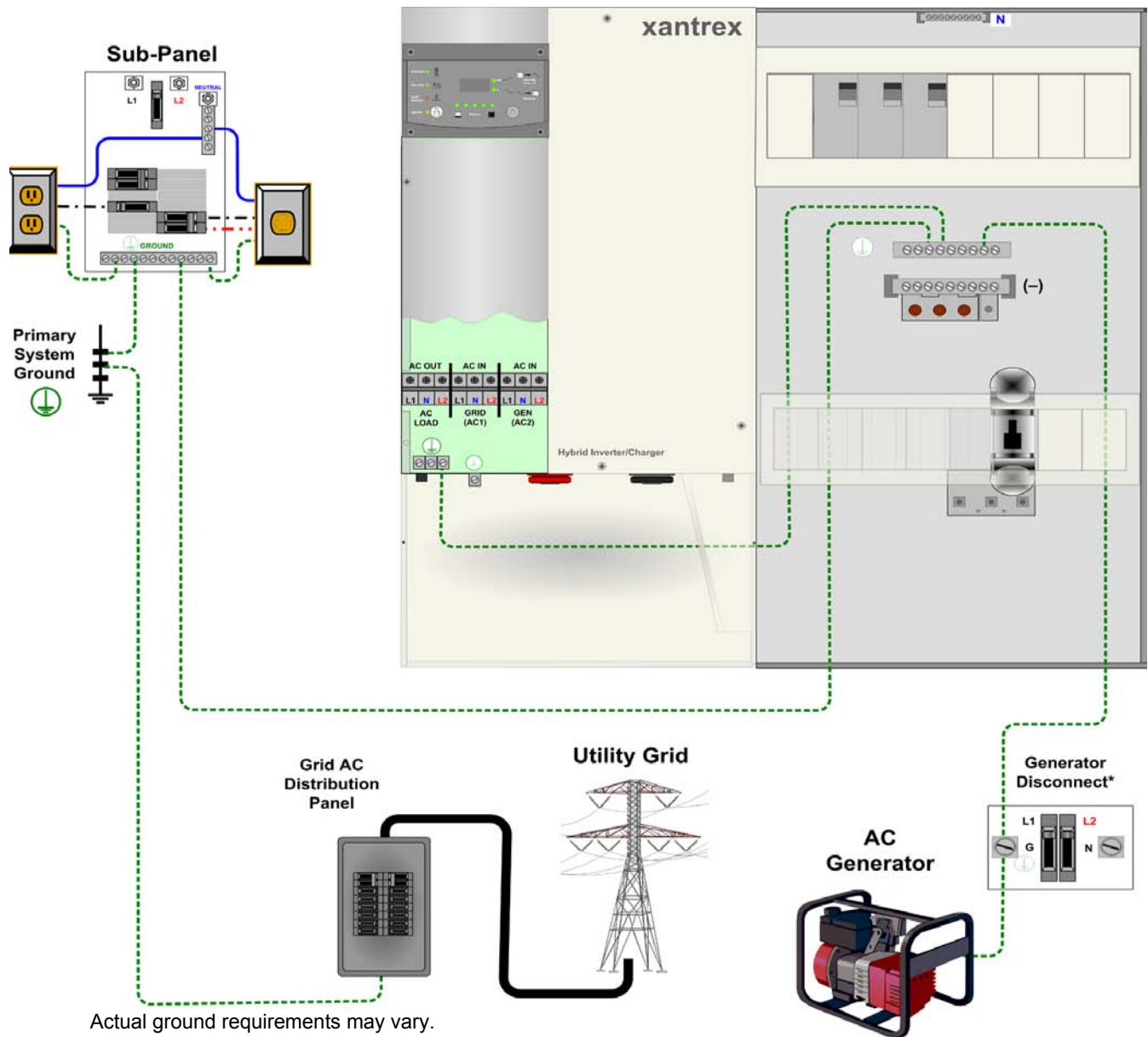
When replacing the AC access cover, ensure its recessed edge slips inside the edge of the front panel.

Figure 2-13 AC Terminal Block

## Grounding the AC System

**Important:** Place the Neutral-to-ground bond in a permanently installed AC distribution panel that is part of the system. This may be a main panel or a sub-panel.

See Table 2-4 on page 10 for torque values for the AC terminal and AC Ground bar.  
See Figure 2-8 on page 2–11 for torque requirements for the ground bar in the XW Power Distribution Panel.



In an off-grid installation (i.e., where no utility grid is available), the generator can be connected to the breakers provided in the XW Power Distribution Panel. No additional breaker is required.

\* Depending on the location of the generator and local code requirements, the generator disconnect may be located in the power distribution panel.

**Figure 2-14** Grounding the AC System using the Distribution Panel

## AC Wiring to the Inverter AC Distribution Panel

An inverter AC distribution panel (also known as a sub-panel or inverter load panel) and AC conduit must be installed before AC wiring is connected to the inverter.

### Install the inverter AC distribution panel and conduit as follows:

1. Determine the location for the inverter AC distribution panel and install it according to the manufacturer's directions.
2. Install an AC conduit between the XW Power Distribution Panel and the inverter AC distribution panel.
3. Determine which circuits the inverter will power and install the appropriate circuit breakers into the inverter panel.
4. For On-Grid systems:
  - a) Disconnect all power to the main utility panel.
  - b) Determine which circuits will be backed by the inverter(s) and remove their wires from the main panel.
  - c) Reroute these wires to the new inverter subpanel.
5. Remove unused breakers from utility panel. It is now safe to re-energize the main utility panel.
6. Install a 60-amp maximum (disconnect) main circuit breaker in the inverter panel. This will later be wired to the inverter's output.



### WARNING: Shock Hazard

Before making any electrical connections, ensure both the AC and DC disconnect devices are in the OPEN (disconnect) position.



### CAUTION: Equipment Damage

Verify that only one neutral/ground bond exists in the system. Having more than one neutral to ground bond in a system violates local electrical codes, may create a shock or fire hazard, and may cause some sensitive equipment to malfunction.



### CAUTION: Damage to the Inverter

The inverter's AC output must never be wired to the utility or generator output. This will cause severe damage to the inverter which is not covered under warranty.

## AC Wiring to the XW Power Distribution Panel

### To connect the XW Power Distribution Panel to the inverter:

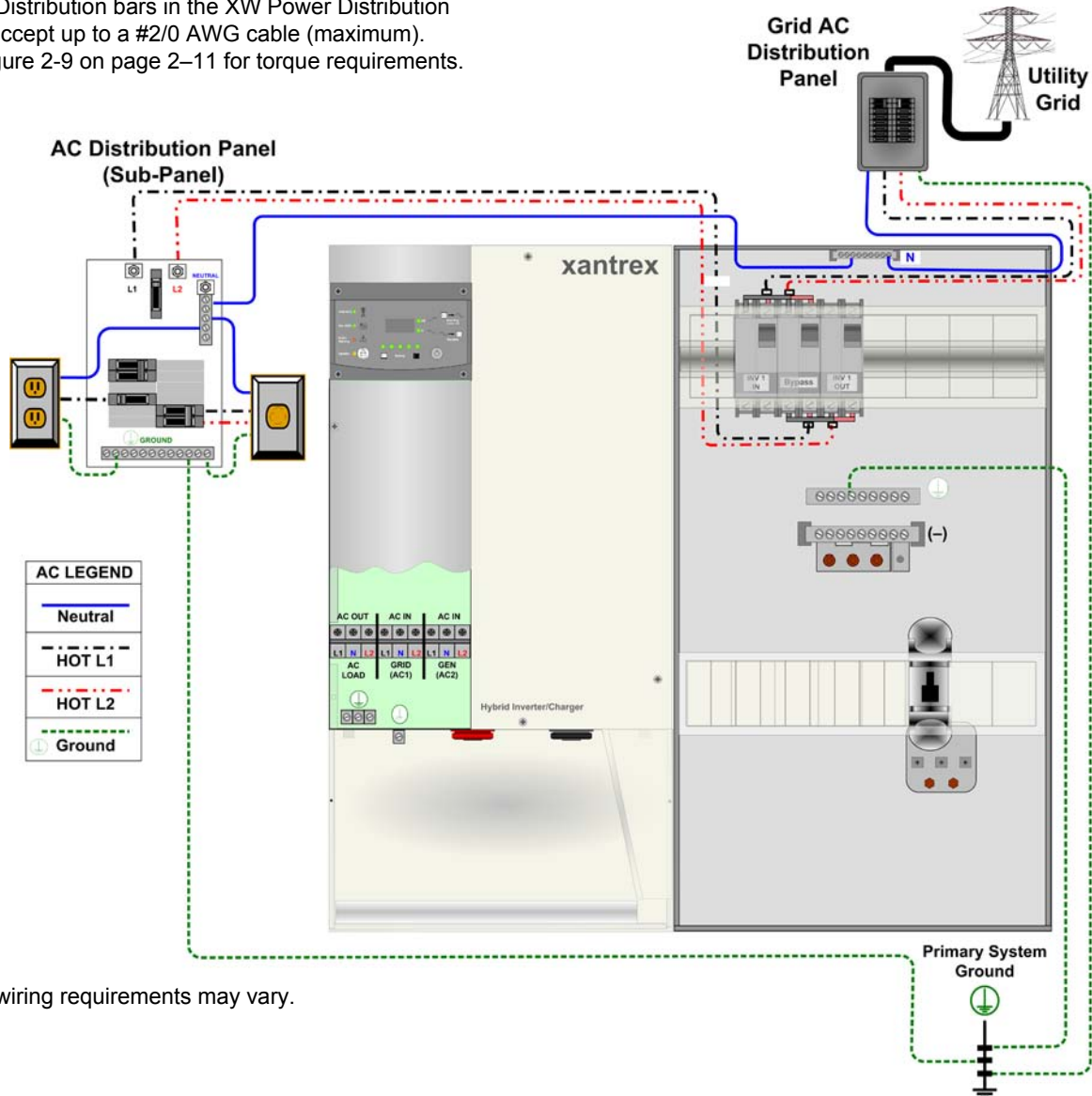
**Important:** The XW Inverter/Charger is provided with fixed disconnect limits for voltage and frequency. These limits are fixed when the unit is exporting power to the grid. The unit shall not be aggregated such that it can export more than 30 kW on a single point of common connection.

**Important:** Both lines of input power must be connected in order for the XW Inverter/Charger to operate. For example, L1 and L2 of Grid Input and/or L1 and L2 of Gen Input need to be connected.

1. Connect the wires labelled "INV1 N-LOAD (SPLIT PHASE)", "INV1 L1-LOAD, and "INV1 L2-LOAD" (from the L1 and L2 terminals on the input (top) side of the output breaker and the neutral bus) to the AC Load (L1-LOAD, N-LOAD, L2-LOAD) terminals on the inverter. Connect the neutral wire first to the N-LOAD terminal.

2. Connect the wires labelled “INV1 L1-GRID” and “INV1 L2-GRID” to the inverter. If the AC source will be the utility grid, connect to the GRID (AC1) terminals (L1-GRID, L2-GRID). If the system will be off-grid and the only AC source will be a generator, these wires can be connected to the GEN (AC2) terminals (L1-GEN, L2-GEN). No additional neutral connection is needed when using the XW Power Distribution Panel. (Additional neutral terminals (N-GRID, N-GEN) are provided on the inverter for installations that do not use the XW Power Distribution Panel.)
3. Connect L1 (from the L1 output Power Distribution Bar) and L2 (from the L2 output Power Distribution Bar), Neutral, and Ground to the sub-panel that supplies power to inverter loads.
4. Connect L1 and L2 from the input side of the AC1 Breaker (L1 and L2 Power Distribution bars) to the utility grid AC Panel. Connect Neutral from the XW Power Distribution Panel to the utility grid AC panel. Connect the ground wire between the XW Power Distribution Panel and the utility grid AC panel.

Power Distribution bars in the XW Power Distribution Panel accept up to a #2/0 AWG cable (maximum). See Figure 2-9 on page 2–11 for torque requirements.

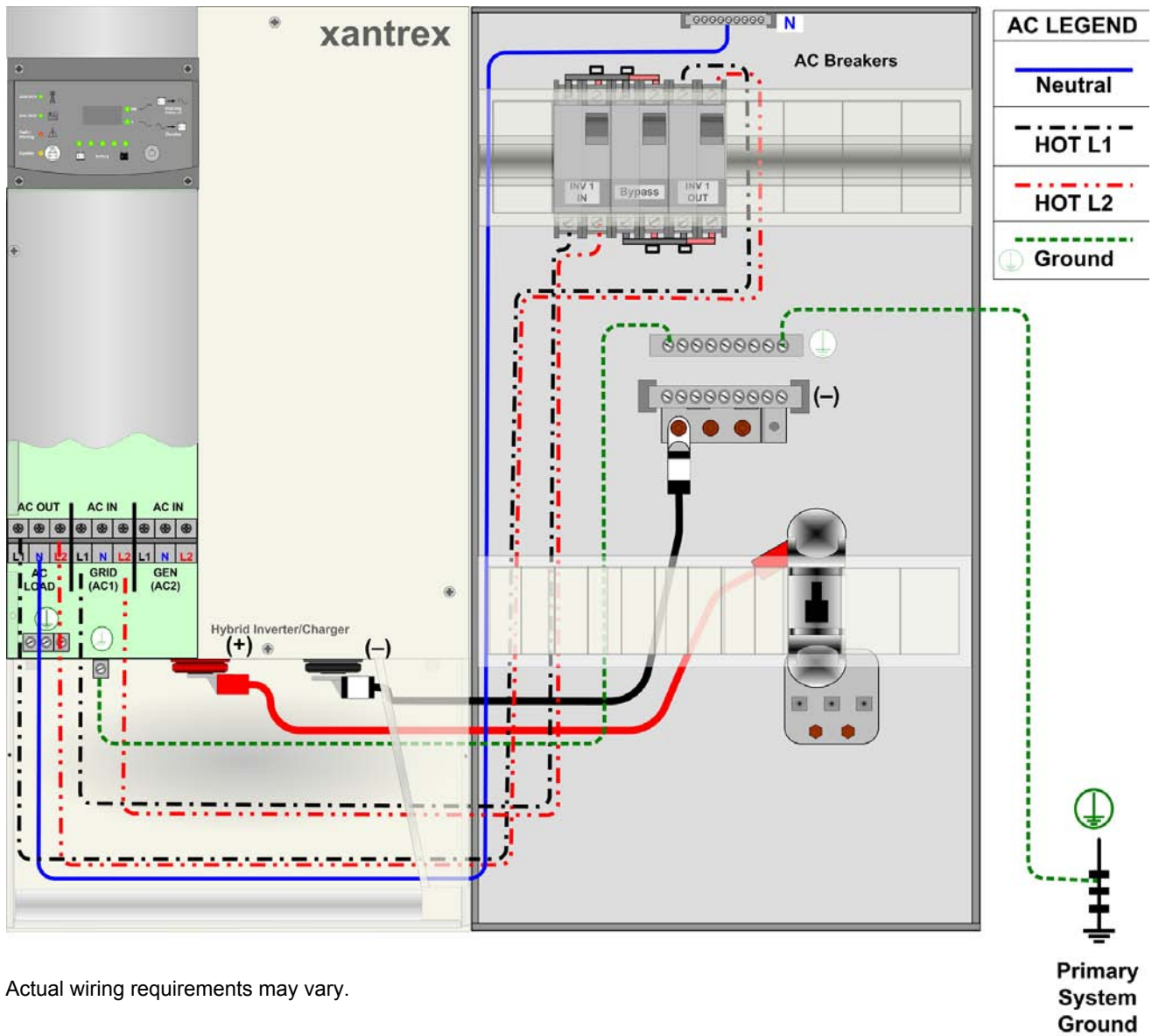


Actual wiring requirements may vary.

Figure 2-15 Wiring the XW Power Distribution Panel to the Sub-panel or Utility Grid

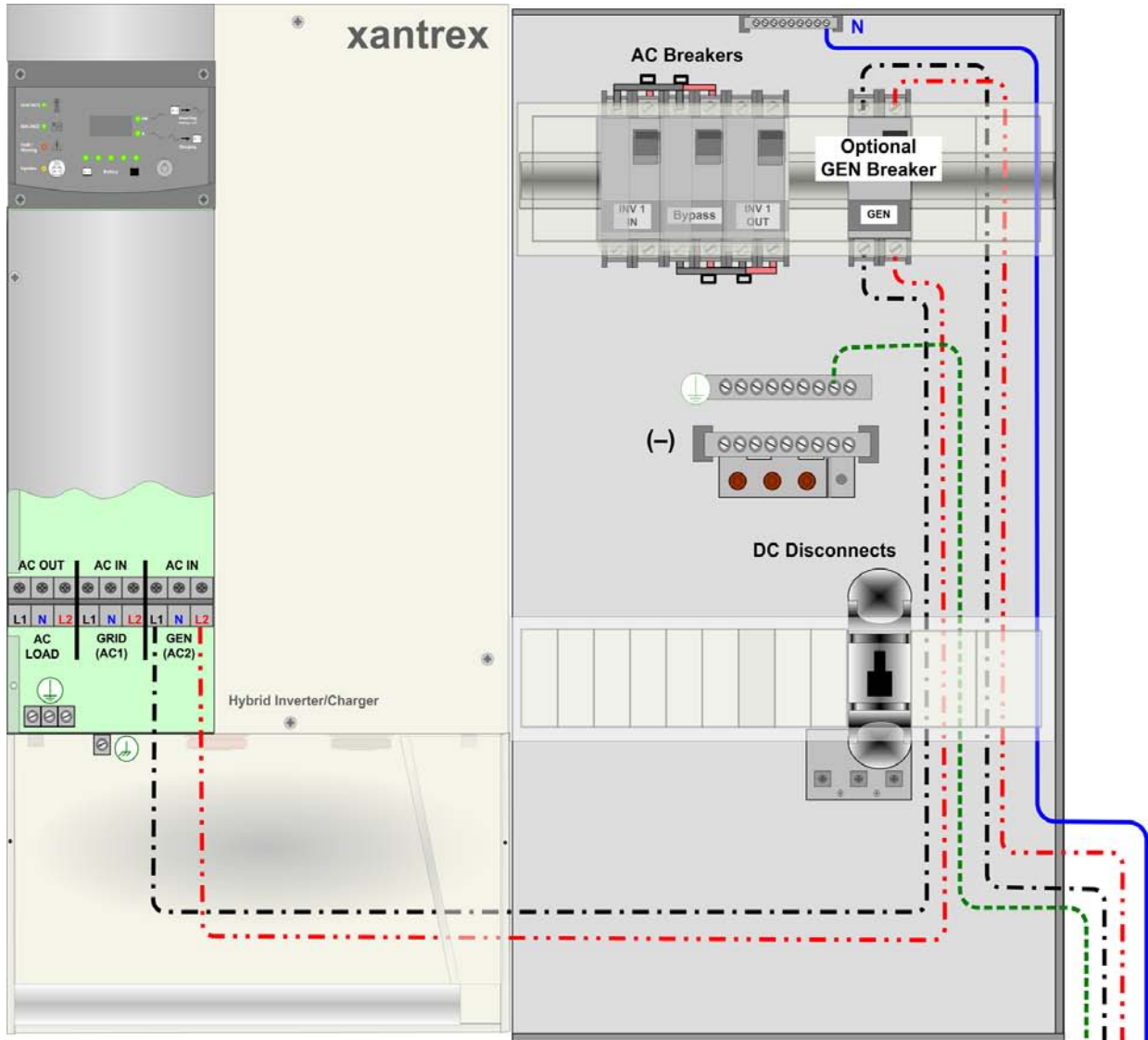
### Wiring the XW Inverter/Charger to a XW Power Distribution Panel

Power Distribution bars in the XW Power Distribution Panel accept up to a #2/0 AWG cable (maximum). See Figure 2-9 on page 2-11 for torque requirements.



**Figure 2-16** Wiring the Inverter to the XW Power Distribution Panel

**Generator Wiring to the XW Inverter/Charger using a XW Power Distribution Panel**

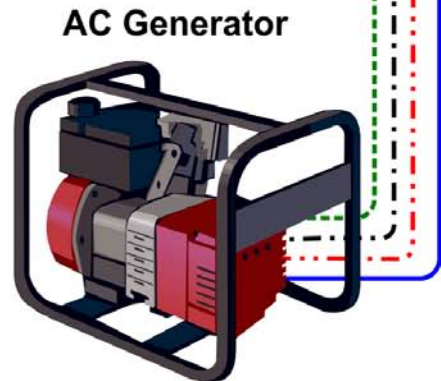


**CAUTION:** Generators must be hard-wired to the XW Power Distribution Panel.

In an off-grid installation (i.e., where no utility grid is available), the generator can be connected to the breakers provided in the XW Power Distribution Panel. No additional breaker is required.

Actual wiring requirements may vary.

| AC LEGEND |         |
|-----------|---------|
|           | Neutral |
|           | HOT L1  |
|           | HOT L2  |
|           | Ground  |



**Figure 2-17** Generator Wiring Using a XW Power Distribution Panel

## AUX Port

The XW Series has a 12 Vdc auxiliary output that can be configured to trigger in response to one of the following battery conditions:

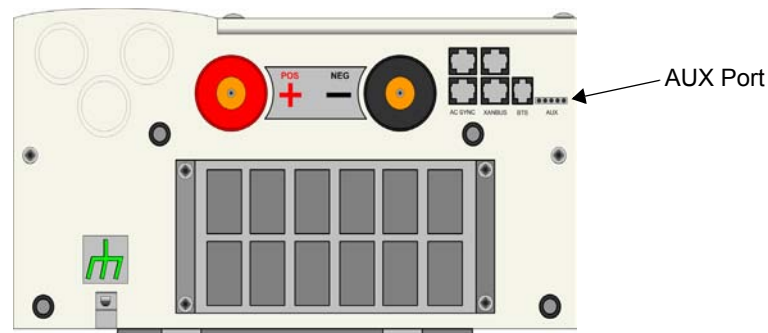
- low battery voltage
- high battery voltage
- low battery temperature
- high battery temperature
- any device fault

The auxiliary output can also be triggered manually.

The 12 Vdc output can be used to trigger a relay to disconnect batteries from the inverter/charger when battery voltage or temperature are out of the ideal range.

The auxiliary output is designed to provide the following functions:

- Auxiliary 12 Vdc power supply
- Remote Power Off



**Figure 2-18** AUX Port Location

## AUX+12V Voltage Supply

DC voltage is available between JU-1 (AUX +12 V) and JU-3 (AUX-COM, signal return). The power available at these terminals is 12 Vdc and maximum current is 0.25 Adc (3 watts).

AUX+12 V and AUX-COM terminals can be used: to power a relay (3 watts maximum). Additional fuses are not required, but may be required for some installations.

AUX +12 V voltage supply can be programmed for different tasks ON and OFF using the XW System Control Panel.

Default status of AUX+12 V is OFF.

### AUX-RPO: User Remote Power Off (RPO)

Connecting JU-2 (AUX-RPO) and JU-3 (AUX-COM) terminals together through an external switch (normal open contact) will provide the system shut off function if the switch is closed.

The external switch if pressed overrides the control provided from the front panel.

If the external switch is cleared (not pressed), the system can be enabled back from the front panel.

Select an external switch with normal open contact; consult your local system designer or qualified technician for specific installation instructions.

### User Line Wiring

Use twisted pairs of #24 AWG to #12 AWG for connections. Carefully route the wires away from high power load cables to minimize noise effects on signal integrity.

### AUX Port Terminal Assignments

**Table 2-11** User Connector Terminals and Functions

| Pin  | Reference       | Name                      | Function  |
|------|-----------------|---------------------------|---|
| JU-1 | AUX+12V         | +12 V User Voltage Supply | +12 Vdc Voltage source: 0.25 Adc maximum  |
| JU-2 | AUX-RPO         | Remote Power Off          | Remote Power Off Logic Level: Active Low. Connecting this signal shuts down system operation. |
| JU-3 | AUX-COM         | Common Ground Reference   | Return Common Ground Reference for 12V, Remote Power Off signals.                             |
| JU-4 | Not Operational | Not Operational           | Not Operational   |
| JU-5 | Not Operational | Not Operational           | Not Operational   |



## Basic Functional Test - Single Inverter

The following steps will complete a basic functional test of the XW Inverter/Charger. If any test fails, please refer to the Troubleshooting section in the XW Inverter/Charger Operation Guide for assistance.

### Confirm All Connections

Once the AC and DC wiring have been installed and connected, take a moment to go back over all connections and make sure they are secure and have been installed correctly.

### Applying DC Power to the Inverter



#### CAUTION: Reverse Polarity Damage

Before making the final DC connection or closing the DC breaker or disconnect, check cable polarity at both the battery and the inverter/charger. Positive (+) must be connected to positive (+). Negative (-) must be connected to negative (-).

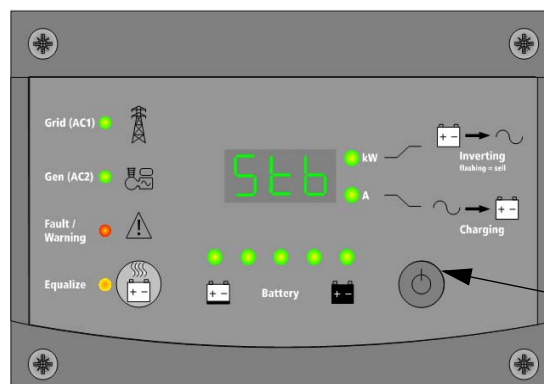
Reverse polarity damage is not covered by warranty.

#### To apply DC power to the inverter:

1. Before applying DC power to the inverter, measure the voltage and polarity of the cables (measure at the battery side of the disconnect or breaker).

**Important:** Voltage should be between 40 to 60 volts for a 48-volt system, and 20 to 30 volts for a 24-volt system. If the DC voltage is low, the battery bank needs to be charged externally. Charge the battery bank and restart the functional test.

2. Apply battery (DC) power to the inverter by closing the battery bank DC disconnect. The inverter will power up, the display will illuminate, but the inverter will remain in the Standby Mode (as shown in Figure 2-19).



Note: If the inverter was previously powered up then it will power-up in the last operating state (Operating or standby)

All LEDs temporarily illuminate.

ON/OFF Button

Figure 2-19 Power-up Display

## Enable the Inverter



### CAUTION: Equipment Damage

Prior to activating the inverter, ensure that all AC loads are disconnected from the output of the inverter.

By default, Invert Mode is enabled and the unit should start inverting upon transitioning from Standby Mode. If Invert Mode is disabled, the display will show (---) once out of Standby Mode. If the unit powers up in Standby Mode, press the ON/OFF button momentarily to change the mode from Standby to Operating.

#### To enable the inverter:

- ◆ Press the inverter ON/OFF button and the Equalize button at the same time. “En” is briefly displayed on the inverter panel to indicate the inverter is enabled.

#### To disable the inverter:

- ◆ Press the inverter ON/OFF button and the Equalize button at the same time. “diS” is briefly displayed on the inverter panel to indicate the inverter is disabled.

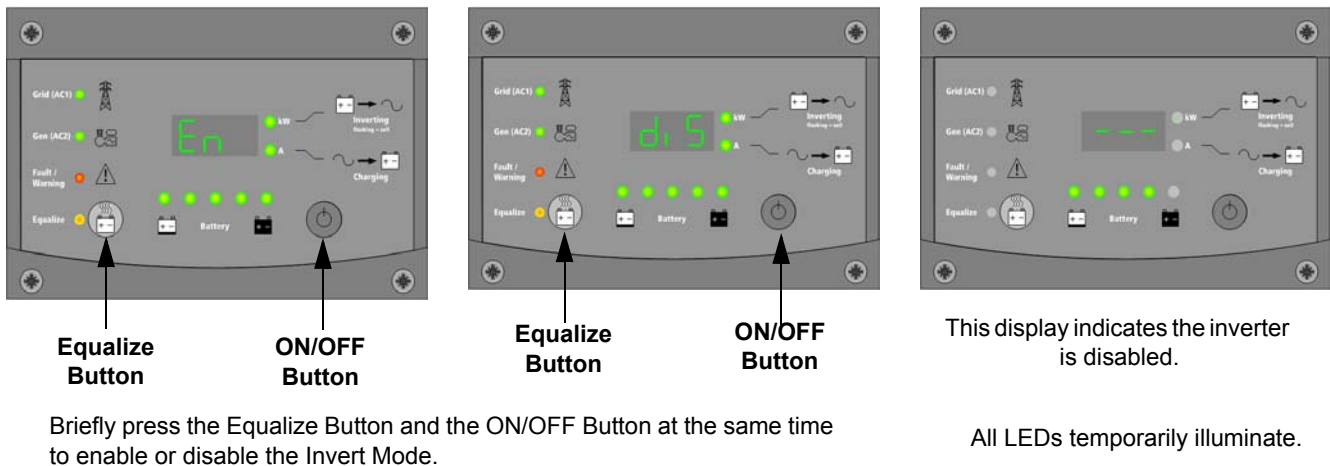


Figure 2-20 Enable the Inverter

3. Monitor the INVERT (Green kW) LED to confirm which mode the inverter is in:
  - LED Off – Invert Mode is disabled. The inverter/Charger is not powering the AC loads. However, if good AC is present, it is passed through to the loads.
  - One blink/sec – The inverter/charger is in the Search Mode and is looking for an AC load greater than the Search Watts setting (default = 25 watts). The Display shows Sch (Search) when this mode has been enabled.
  - LED On – The inverter/charger is on. The inverter is operating and is able to provide power to the AC loads. This is the default mode on initial powerup once the unit is taken out of Standby Mode.

If the inverter is not operating or the INVERT LED (kW) does not illuminate, check all connections. Check the inverter’s DC voltage on the positive (+) and negative (–) terminals. Check the Fault LED. If the fault LED is illuminated, check for a fault code on the information panel. Correct the reported fault if possible and clear the fault. If the DC voltage is low, the battery bank needs to be charged externally. Charge the battery bank and restart the functional test.

## AC Voltage Check

**Important:** This test requires the use of a voltmeter.

### To perform an AC voltage check:

1. With the inverter on (INVERT [green, kW] LED on solid), verify the AC voltage at AC Loads block terminal L1-Load to N-Load.
2. Verify that neutral is bonded to ground in the system by measuring the hot and neutral voltages relative to ground. Neutral-to-ground should equal zero (0) volts.
3. After confirming the correct AC voltage, turn on your AC output breaker and place a load on the inverter (plug in a light or other load to an outlet the inverter is powering).
4. Confirm that the AC load that was just applied works properly.

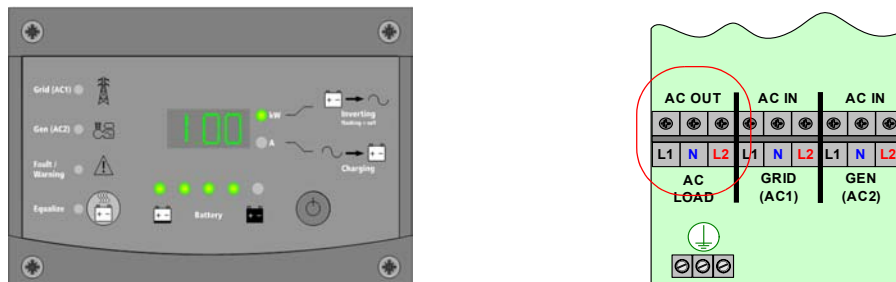


Figure 2-21 Checking AC Voltage

## Confirming Battery Charger Operation

### To confirm battery charger operation:

1. Apply AC from grid or generator, confirm voltage.
2. Check LEDs (AC1 or AC2) on the front panel. One of them must be illuminated for the unit to charge. Check the “A” LED. If the “A” LED is illuminated, the unit is charging and the battery current is displayed on the information panel.

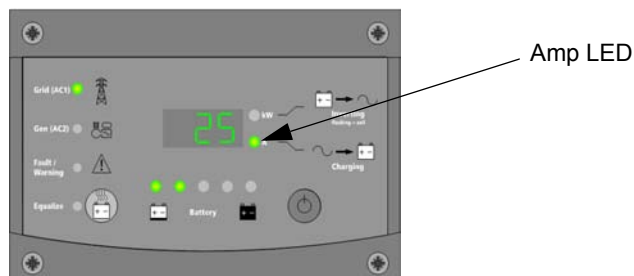


Figure 2-22 Checking Charging Operation

**Important:** Unless the inverter/charger settings have been changed, the inverter will charge as if it has a large (> 440 Ah) flooded battery bank (factory default setting). Therefore, ALL systems may need to have the battery charging set points “fine tuned” to avoid damage to the batteries.

This completes the functional test. If all tests pass, the inverter is ready for use. If any of the inverter’s internal set points need to be adjusted, consult the configuration chapter of the operation guide.

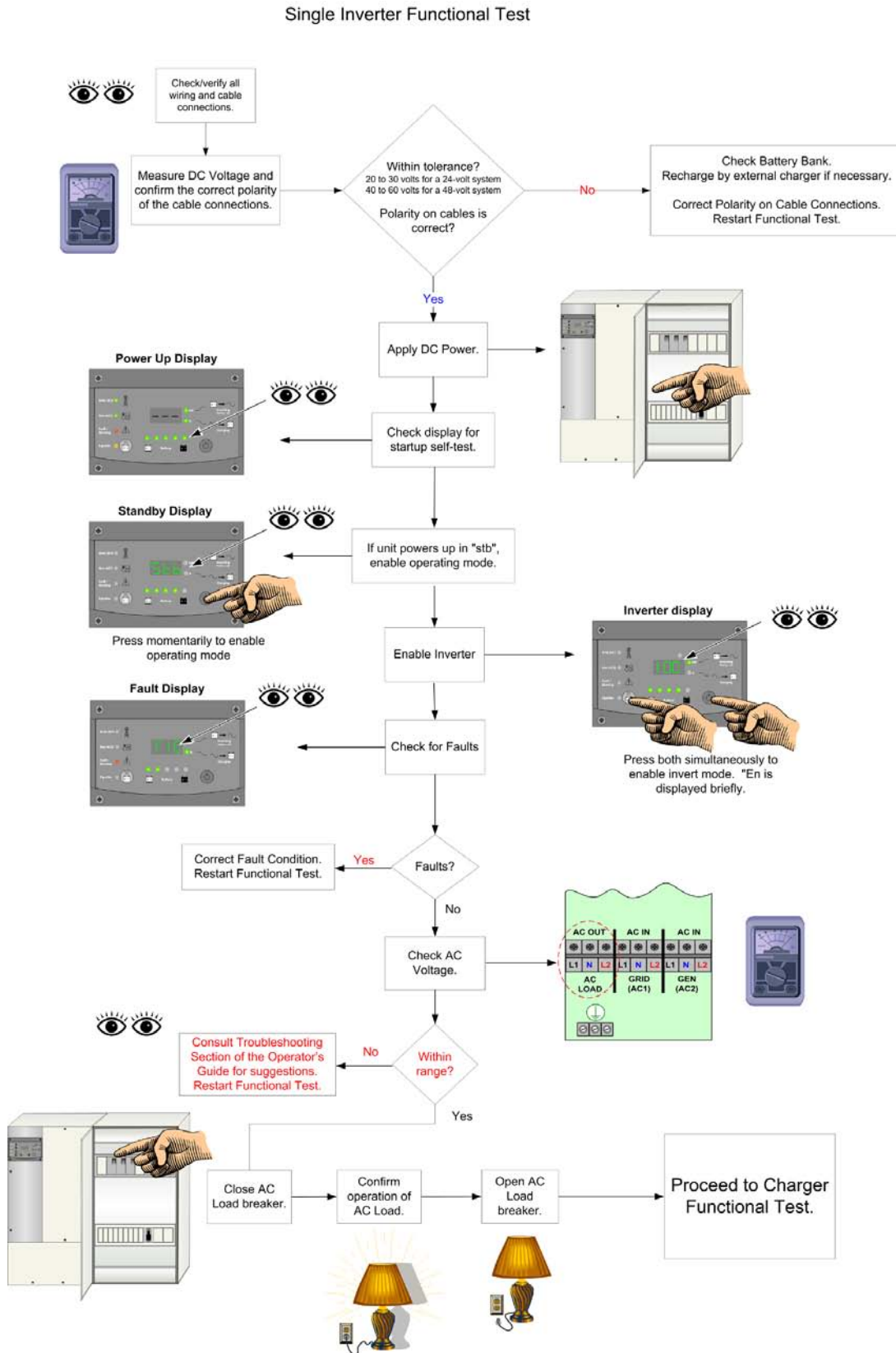


Figure 2-23 Functional Test for Single Inverter Systems

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## Step 5: Installing Additional Inverters

### Installation Steps

**To install multiple inverters:**

1. Disconnect all power from the system.
2. Mount additional inverter(s). See “Step 1: Installing the Mounting Plate” on page 2–4 and “Step 2: Mounting the Inverter” on page 2–6.
3. Install the XW Conduit Box. See “Step 3: Mounting the XW Power Distribution Panel and XW Conduit Box” on page 2–7.
4. Install AC sync cable(s) as required. See “Xanbus and AC Sync Cable” on page 2–38.
5. Install a XW System Control Panel to configure programmable settings and to name specific network components (e.g., XW1, XW2 etc.). See “The XW System Control Panel” on page 5–2.
6. Convert the XW Power Distribution Panel to accommodate the extra inverter by installing the additional breakers and components. See page 2–30 for instructions on converting the XW Power Distribution Panel to a dual-inverter configuration. See page 2–34 for converting the XW Power Distribution Panel to a triple-inverter configuration.
7. Attach Bypass interlock plate to distribution panel cover.
8. Connect DC wiring. See Figure 2-24 on page 2–31 for dual-inverter configurations and Figure 2-27 on page 2–35 for triple-inverter configurations.
9. Connect AC wiring. See Figure 2-26 on page 2–33 for dual-inverter configurations. For triple-inverter Configurations, see Figure 2-28, “Triple-Inverter AC Breaker Arrangement and Wiring Enlargement with Multiple AC Input Sources” on page 2–36 or Figure 2-29, “Triple-Inverter AC Breaker Arrangement and Wiring Enlargement with a Single AC Input Source” on page 2–37.

## Parts List for Dual-Inverter Configurations

Installing an additional inverter using the power distribution panel requires an XW Connection Kit (part number 856-1020), which contains the following components:

- XW Conduit Box
- Three 60 amp, 120/240 VAC, 2-pole, Square-D Type QOU, DIN-rail mount, AC breakers for Inverter Input, Output, and Bypass
- Four Power Distribution bars
- Custom Bypass Interlock
- #6 AWG AC wiring to connect the inverter to AC breakers
- GJ250A, 160VDC, 3/8" Stud, DC Breaker with copper bus bar for DC positive
- one pair #4/0 battery cables to connect the inverter to DC breakers
- Xanbus and AC Sync Cable (CAT 5 cable with RJ45 connectors wired to T568A standard).
- Miscellaneous bushings

---

**Important:** When installing more than one inverter at a location, a XW System Control Panel will be required to give each inverter (as well as other Xanbus-enabled devices) a unique name and to modify the factory-installed default settings to match and support the installed configuration.

---

## Converting a Single-Inverter Power Distribution Panel to a Dual-Inverter Power Distribution Panel

- ◆ Remove upper wire cover and lower wire cover on the XW Power Distribution Panel.

### DC Wiring for a Dual-Inverter System

1. Remove positive distribution plate attached to bottom terminal on existing DC disconnect/breaker.
2. Install second DC disconnect/breaker (supplied in 865-1020) next to existing DC disconnect/breaker.
3. Replace the factory-installed DC positive bus bar with the larger positive bus bar provided in the 865-1020. This larger DC positive bus bar supports up to three GJ250 Adc disconnect/breakers.
4. Connect positive battery cable for second inverter (supplied in 865-1020) to top terminal on second DC disconnect/breaker.
5. Connect negative battery cable for second inverter (supplied in 865-1020) to DC negative distribution plate.
6. Connect positive and negative battery cables to second inverter.
7. Remove knockout on the lower cover for additional disconnect/breaker to fit through.
8. Re-install lower wire cover.

AC Breakers shown in this illustration represent the breaker arrangement for a single AC source.

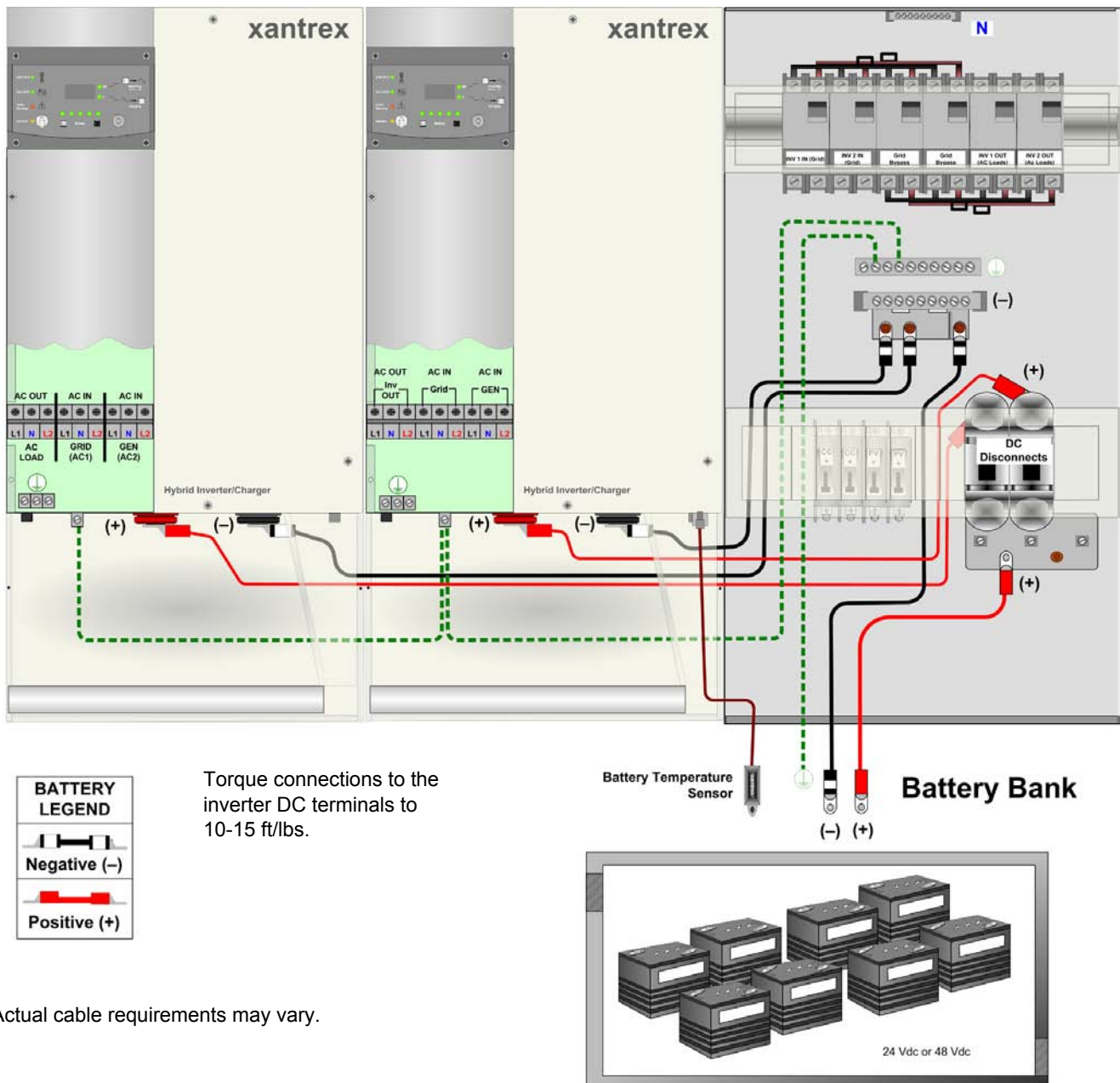
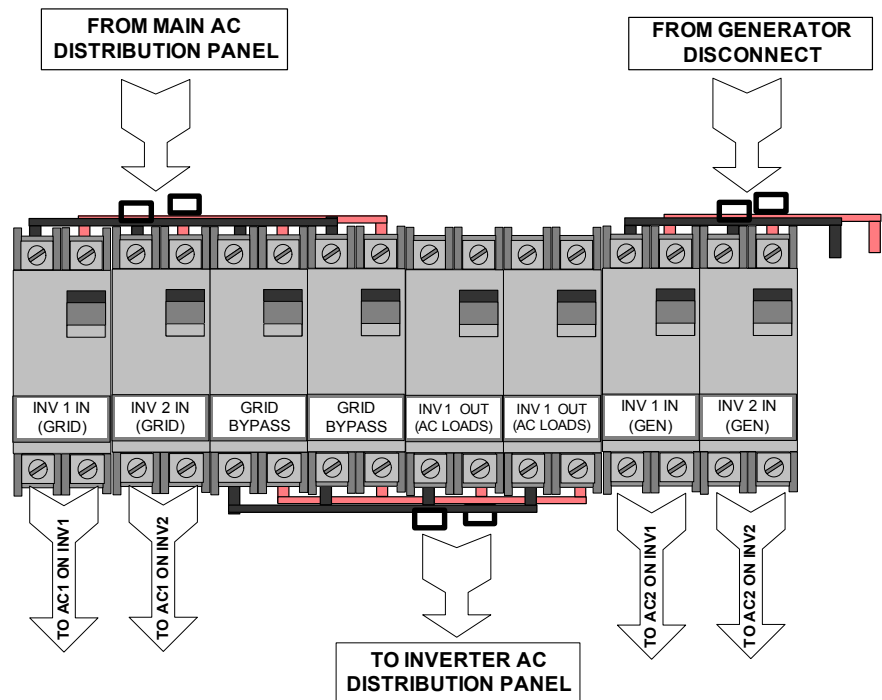


Figure 2-24 DC Connections to Dual Inverters

## AC Wiring for a Dual-Inverter System

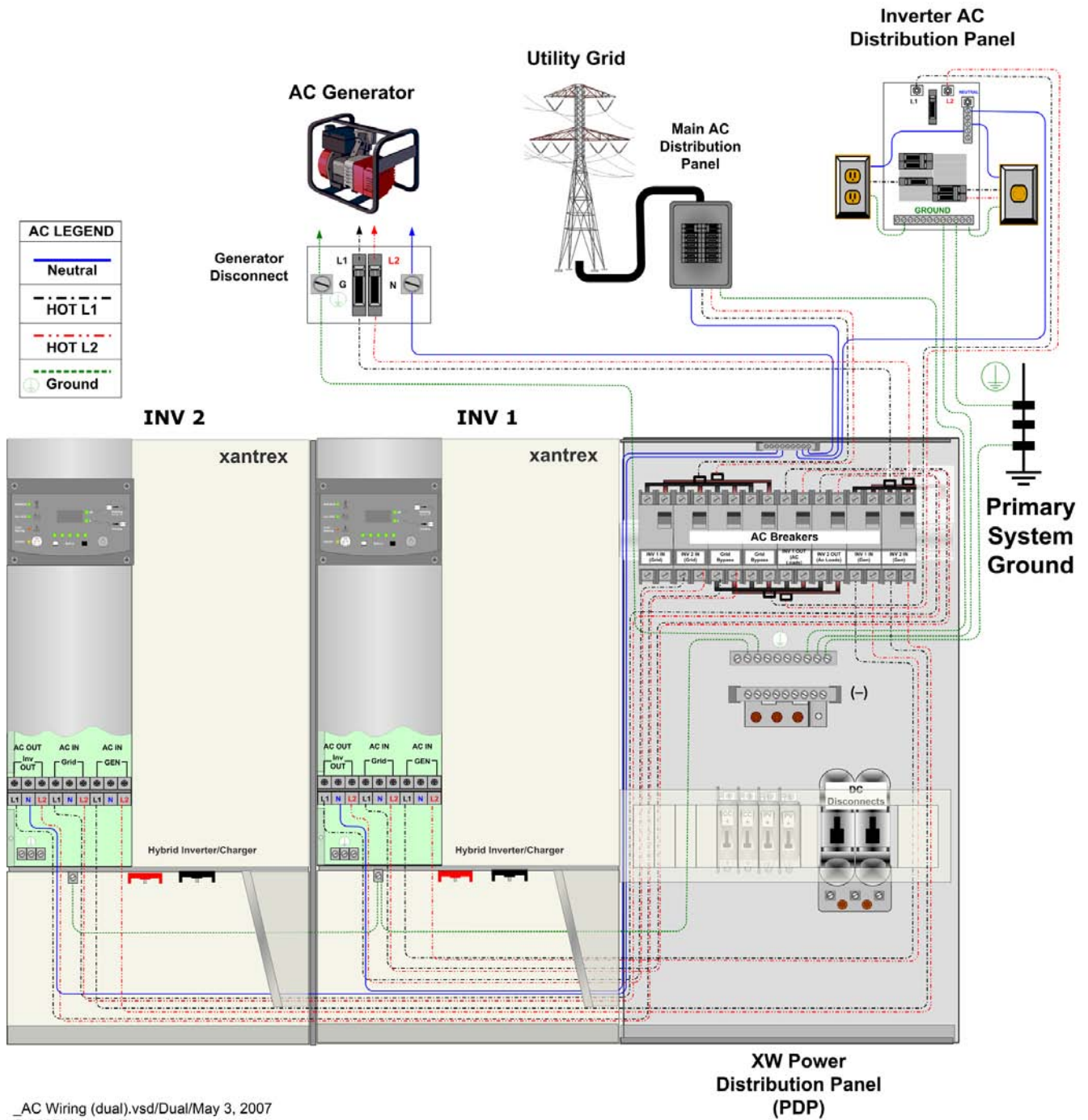
1. Disconnect the AC wires (from the utility grid or generator and to the sub-panel) and remove the factory-installed distribution bars connected to top and bottom terminals on the AC breakers.
2. Remove bypass interlock bracket.
3. Disconnect INV1 AC LOAD (INV1 L1-LOAD, INV1 L2-LOAD) wires from top terminals on right-hand side breaker.
4. Add three additional dual-pole AC breakers (supplied in 865-1020) next to the existing three dual-pole AC breakers.
5. Attach the four distribution bars (supplied in 865-1020) to top and bottom of AC breakers as shown in dual-inverter system wiring diagrams.
6. Connect grid wiring and loads/subpanel wiring to the new distribution bars as shown in Figure 2-26.
7. Connect INV1 LOAD (INV1 L1-LOAD, INV1 L2-LOAD), INV2 LOAD (INV2 L1-LOAD, INV2 L2-LOAD), and INV2 GRID (INV2 L1-GRID, INV2 L2-GRID) wires to AC breakers as shown in Figure 2-26.
8. Connect neutral (INV2 N-LOAD (SPLIT-PHASE)) and ground (INV2 GROUND) wiring as shown in dual-inverter system wiring diagrams.
9. Connect wiring at the inverter/chargers as shown in Figure 2-26.
10. Remove the knockouts on upper wire cover for additional breakers to fit through.
11. Re-install upper wire cover. Relabel the AC breakers with the appropriate labels provided with the XW Power Distribution Panel.
12. Install bypass interlock plate with provided screws and nylon shoulder washers (supplied in 865-1020).

Power Distribution bars in the XW Power Distribution Panel accept up to a #2/0 AWG cable (maximum). See Figure 2-9 on page 2-11 for torque requirements.



**Figure 2-25** Dual Inverter AC Breaker Arrangement and Wiring Enlargement with Multiple AC Input Sources





Power Distribution bars in the XW Power Distribution Panel accept up to a #2/0 AWG cable (maximum). See Figure 2-9 on page 2-11 for torque requirements.

Figure 2-26 AC Wiring for Dual-Inverter Systems

## Parts List for a Triple-Inverter Configuration

- ❑ 1 x XW Power Distribution Panel (PDP) and Accessory kit (mounts to first unit).
- ❑ 1 x 865-1020 PDP extension kit for second unit.

The following items are required for the third inverter (furthest from PDP) and should be sourced and prepared prior to the installation. *(Note that all wiring will have to be custom cut to fit the third unit. Wiring supplied with the extension kit is intended for a second inverter in a two inverter system).*

- ❑ 1 x 865-1020 PDP extension kit.
- ❑ 2 x AC Distribution Bars (100-0661-01-01).
- ❑ 2.2 m (87") x #6 AWG, 600 V, 105°C stranded white wire for neutral
- ❑ 2.2 m (87") x #6 AWG, 600 V, 105°C Black stranded wire for L1 Grid (AC1).
- ❑ 2.2 m (87") x #6 AWG, 600 V, 105°C Red stranded wire for L2 Grid (AC1).
- ❑ 2.3m (91") x #6 AWG, 600 V, 105°C Black stranded wire for L1 Gen (AC2).
- ❑ 2.3 m (91") x #6 AWG, 600 V, 105°C Red stranded wire for L2 Gen (AC2).
- ❑ 2.4 m (95") x #6 AWG, 600 V, 105°C Black stranded wire for L1 Gen (AC Load).
- ❑ 2.4 m (95") x #6 AWG, 600 V, 105°C Red stranded wire for L2 Gen (AC Load).
- ❑ 1.6m (62") #4/0 AGW, 105°C, Red stranded with #4/0 x 3/8 lugs crimped at each end for the positive battery cable.
- ❑ 1.6m (62") #4/0 AGW, 105°C, Black stranded with #4/0 x 3/8 lugs crimped at each end for the negative battery cable.
- ❑ External Bypass Switch - The XW Power Distribution Panel does not have enough breaker locations to accommodate bypass breakers in a triple-inverter system. Therefore, an external Bypass Switch may be needed. See Figure 2-30 on page 2–37 for an illustration of how to wire an External Bypass Switch.

## Converting a Single-Inverter Power Distribution Panel to a Triple-Inverter Power Distribution Panel

- ◆ Remove upper wire cover and lower wire cover on the XW Power Distribution Panel.

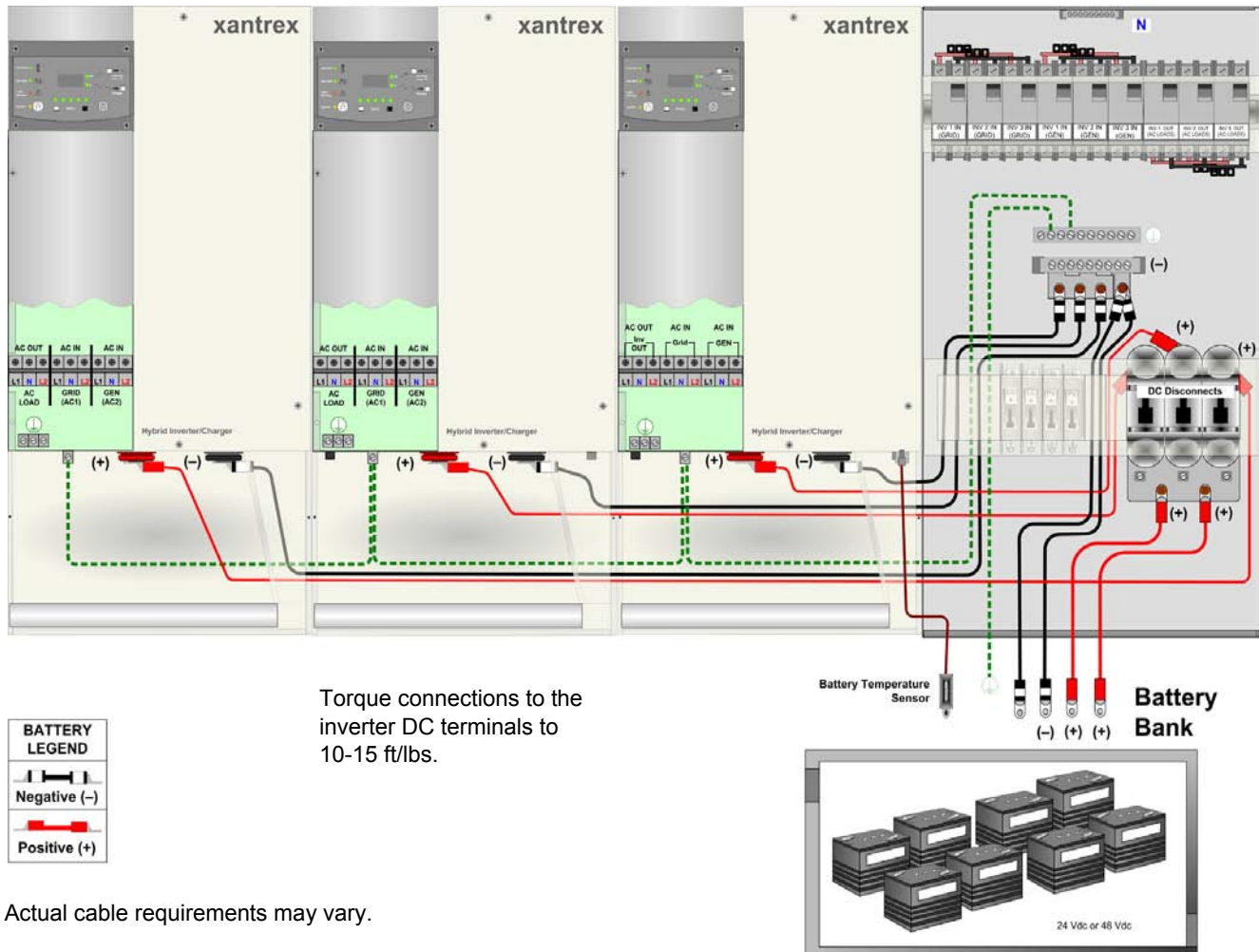
### DC Wiring for a Triple-Inverter System

1. Install all three DC disconnect/breakers (two supplied in 865-1020 and one with PDP).
2. Install larger positive distribution plate (supplied in 865-1020).
3. Connect negative battery cable for first inverter (supplied with PDP) to DC negative distribution plate.
4. Connect negative battery cable for second inverter (supplied in 865-1020) to DC negative distribution plate.
5. Connect negative battery cable for second inverter (custom, see material list) to DC negative distribution plate.

6. Connect positive battery cable for first inverter (supplied with PDP) to top terminal on first DC disconnect/breaker.
7. Connect positive battery cable for second inverter (supplied in 865-1020) to top terminal on second DC disconnect/breaker.
8. Connect positive battery cable for third inverter (custom, see material list) to top terminal on third DC disconnect/breaker.
9. Connect positive and negative battery cables to first inverter.
10. Connect positive and negative battery cables to second inverter.
11. Connect positive and negative battery cables to third inverter.

Power Distribution bars in the XW Power Distribution Panel accept up to a #2/0 AWG cable (maximum). See Figure 2-9 on page 2–11 for torque requirements.

AC Breakers shown in this illustration represent the breaker arrangement for multiple AC source.



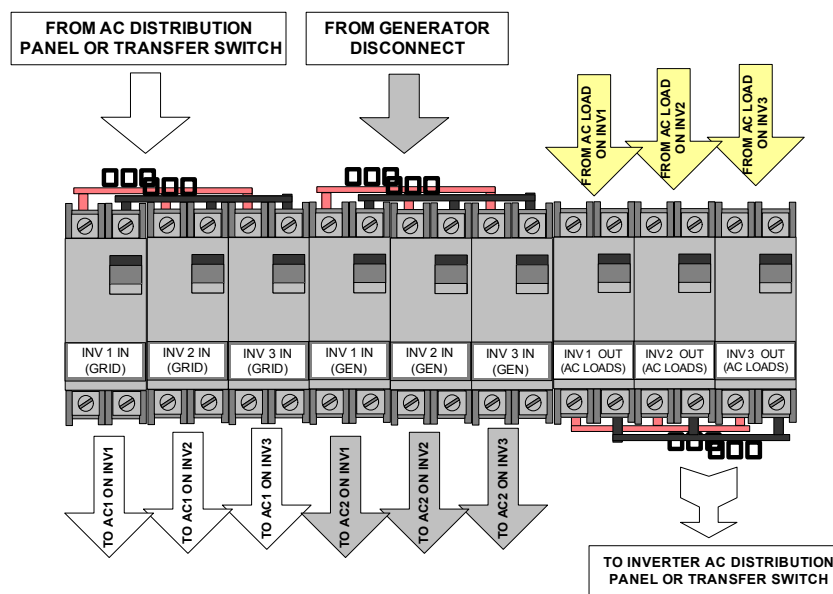
Actual cable requirements may vary.

**Figure 2-27** DC Connections for a Triple-Inverter System

## AC Wiring for a Triple-Inverter System

1. Prepare power distribution bars (supplied in 865-1020) by cutting away one of the four tabs, only three tabs per power distribution bar are required in a three inverter system. A total of 6 distribution bars should be prepared.
2. Mount the nine breakers on the din rail and install power distribution bars as follows:
  - a) Two distribution bars, L1 and L2 at the input (top) terminals of the INV1, INV2 and INV3 Grid breakers.
  - b) Two distribution bars, L1 and L2 at the input (top) terminals of the INV1, INV2 and INV3 Gen breakers.
  - c) Two distribution bars, L1 and L2 at the output (bottom) terminals of the INV1, INV2 and INV3 AC Load breakers.
3. Connect L1 and L2, AC wiring from each INV Grid breaker to the corresponding AC Input (AC1) terminal on each of the three inverters.
4. Connect L1 and L2, AC wiring from each INV Gen breaker to the corresponding AC Input (AC2) terminal on each of the three inverters.
5. Connect L1 and L2, AC wiring from each INV AC Load terminal from each of the three inverters, to the corresponding AC INV Out breaker terminal in the PDP.
6. Connect L1 and L2, AC Load wiring to the INV Out (AC Load) power distribution bar.
7. Connect L1 and L2, AC wiring from the Generator disconnect to the Gen breaker power distribution bars.
8. Connect L1 and L2, AC wiring from the Utility Grid distribution panel to the Grid breaker power distribution bars.
9. Connect neutral wiring from INV1 (supplied with PDP), INV2 (supplied in 865-1050) and INV3 (custom, see material list) to the neutral distribution bar in the PDP.
10. Connect ground wiring from INV1 (supplied with PDP), INV2 (supplied in 865-1050) and INV3 (supplied in 865-1050) to the ground distribution bar in the PDP.

Power Distribution bars in the XW Power Distribution Panel accept up to a #2/0 AWG cable (maximum). See Figure 2-9 on page 2-11 for torque requirements.



**Figure 2-28** Triple-Inverter AC Breaker Arrangement and Wiring Enlargement with Multiple AC Input Sources

Power Distribution bars in the XW Power Distribution Panel accept up to a #2/0 AWG cable (maximum). See Figure 2-9 on page 2-11 for torque requirements.

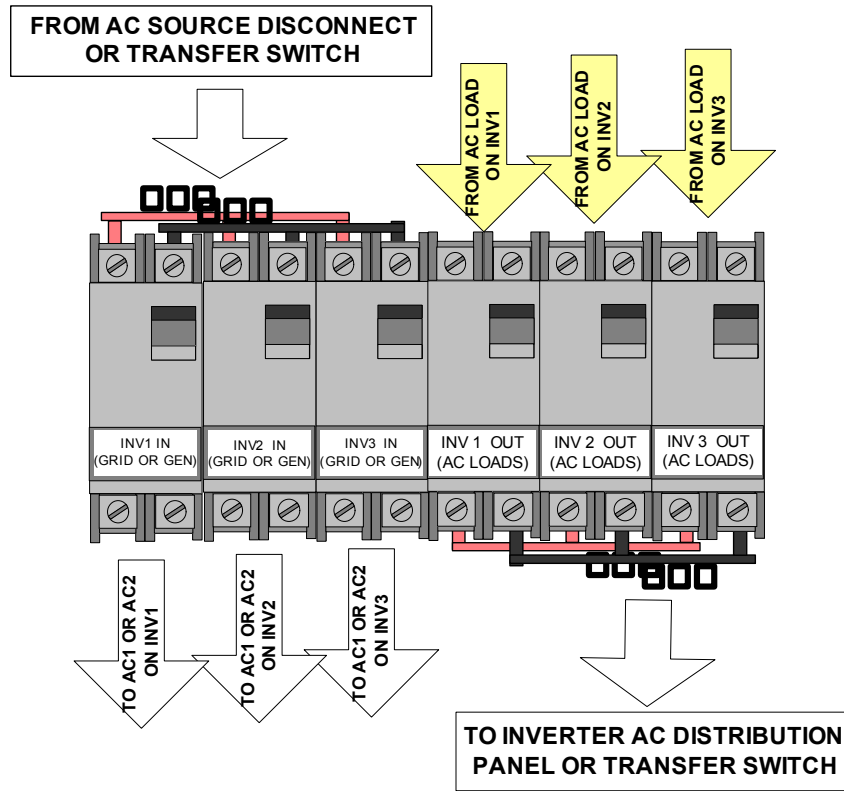


Figure 2-29 Triple-Inverter AC Breaker Arrangement and Wiring Enlargement with a Single AC Input Source

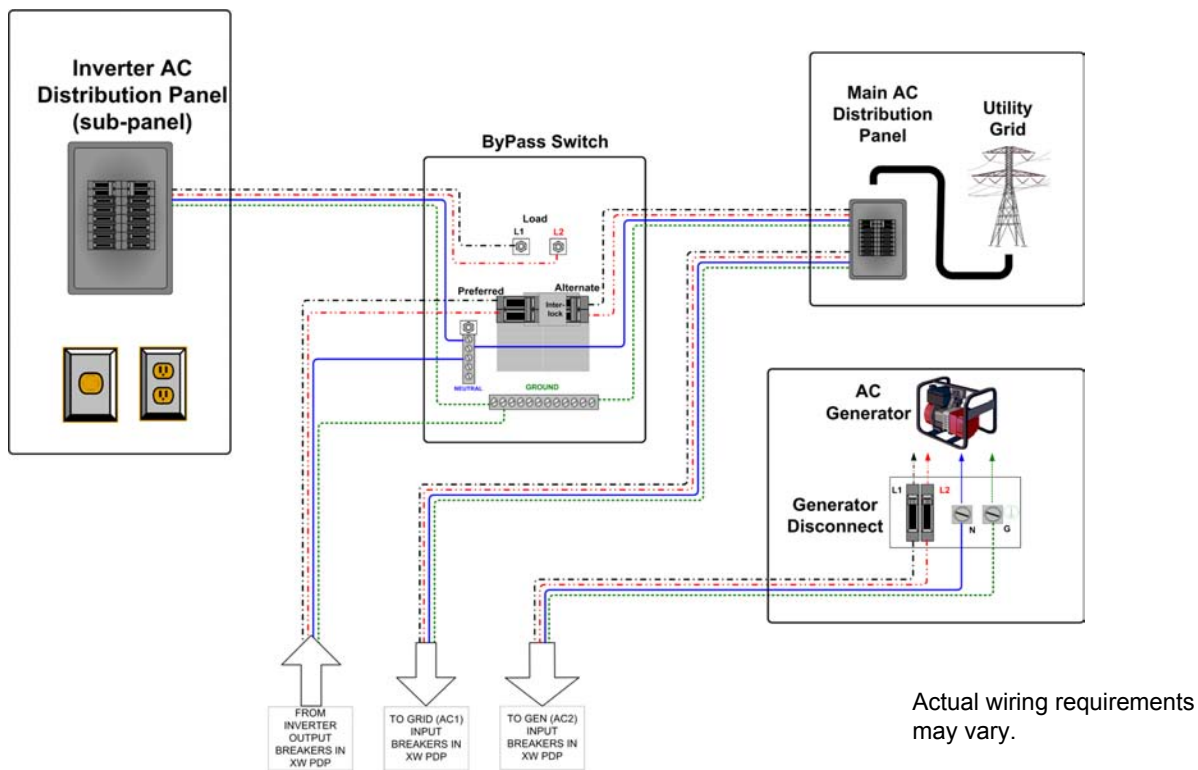


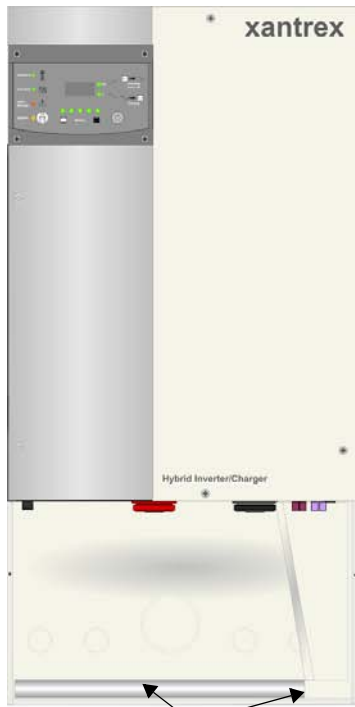
Figure 2-30 Wiring an External Bypass Switch for a Triple-Inverter Configuration

## Xanbus and AC Sync Cable

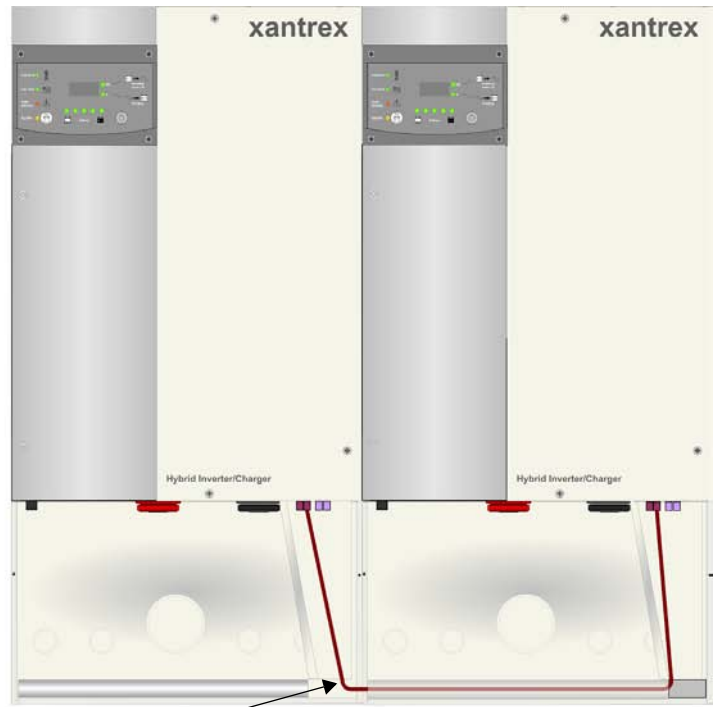
A Xanbus and AC sync cable is required for multi-unit installation. The AC sync cable connects each inverter, and provides the necessary communication and control between multiple units.

Install these cables, routing it through the XW Conduit Box raceway, prior to making the AC and DC wiring connections. See Figure 2-31.

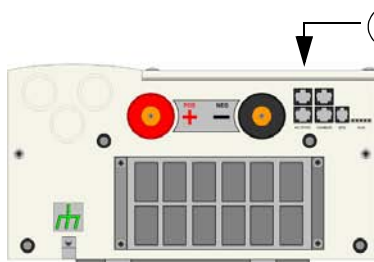
**To install the AC Sync and Xanbus cables between inverters:**



- 1 Remove the two factory-installed raceways for the communication cabling by removing the screw holding each raceway in place.



- 3 Route the cable as shown. Route any additional communication cables through the raceways. Replace the wiring raceways, ensuring not to pinch the cables. Secure the raceways to the XW Conduit Box with the screw that was removed earlier.



- 2 Insert the RJ45 jack on the cable into one of the two AC Sync ports.

**IMPORTANT:**

In a 2-inverter system, install an AC Sync Cable from INV1 to INV2.

In a 3-inverter system, “daisy-chain” an AC Sync Cable from INV1 to INV2 and from INV2 to INV3.

Do NOT install terminators in an AC Sync Port.

**Figure 2-31** Installing the AC Sync Cable

## Basic Functional Test - Multiple Inverters

The following steps will complete a basic functional test of multiple XW Inverter/Chargers. If any test fails, please refer to the Troubleshooting section in the XW Inverter/Charger Operation Guide for assistance.

### To perform a functional test on multiple inverters:

1. Check/verify all wiring and cable connections.
2. Measure DC voltage at the DC terminals on the inverter and confirm its within range and has correct polarity. The acceptable range is >20 Vdc for 24 V system or >40 Vdc for 48-V Systems.
3. Switch INV1 DISCONNECT to ON position.
4. Check inverter display for startup self-test during which all LED's will flash momentarily. Once self-test is complete, inverter will display "Stb". (The Fault/Warning LED may flash for a few seconds but eventually will turn off. If Fault/Warning LED persists, check to ensure battery temperature sensor is connected. Also, if the inverter has been pre-configured, it may go straight into normal operating mode.)
5. Using the XW System Control Panel, set First (Master) Inverter Device Number
  - a) Go to the inverter's *Advanced Settings* menu by pressing Down arrow + Enter from System Status screen and then simultaneously pressing Enter + Up arrow + Down arrow.
  - b) Select *Multi Unit Config* menu.
  - c) Change *Dev Number* from "00" to "01". The inverter will now appear as XW6048-01 in the device list.
  - d) Press Exit to go back to the System Status screen.
6. Switch INV2 DISCONNECT to ON position.
7. Check inverter display for startup self-test during which all LED's will flash momentarily. Once self-test is complete, inverter will display "Stb". (If the inverter has been pre-configured, it may go straight into normal operating mode or display F66 warning.)
8. Using the XW System Control Panel, set Second (Slave) Inverter Device Number and Inverter Mode.
  - a) Select new inverter XW6048-00 in the device list.
  - b) Go to the inverter's *Advanced Settings*>*Multi-Unit Config* menu.
  - c) Change *Dev Number* from "00" to "02" (or the next number that hasn't been used). The inverter will now appear as XW6048-02 in the device list.
  - d) Change *Invtr Mode* from "SplitPhMaster" to "SplitPhSlave".
  - e) Press Exit until you see the System Status screen.
9. Check for faults. If fault condition(s) exist, correct and restart Functional Test.
10. If a third inverter is installed, repeat steps to configure it as a Slave.
11. Using the XW System Control Panel, enable the System
  - a) Go to *System Settings* menu
  - b) Change *System Mode* to "Operating"
  - c) Press Exit until you see the System Status screen.

12. Confirm Master inverter displays “0.00” and Slave(s) displays “---” on their front panels.
13. Check for faults. If fault condition(s) exist, correct and restart Functional Test.
14. Check voltage at AC LOAD terminals of the Master Inverter.
15. Switch the AC Load breakers ON.
16. Confirm operation of connected AC loads.
17. Disconnect AC LOAD breakers.
18. Using the XW System Control Panel, reduce Maximum Charge Rate.
  - a) From System Status screen, go to *System Settings* and enable *Cascading* (if not enabled). With *Cascading* enabled, a change to a setting in one inverter will automatically ripple through to the other inverter(s) in the system.
  - b) Go to *Advanced Settings>Charger Settings* in one of the inverters.
  - c) Set **Max Chg Rate** to 10%.
  - d) Press Exit until you see the System Status screen.
19. Switch AC Input breakers ON. Note - all inverters in the system must be connected to the same AC Input source before they will qualify the source.
20. Confirm both inverters start charging. Note -- With the **Max Chg Rate** set to 10% the maximum charge rate is limited to 10 A on each inverter. Depending on the battery bank’s state-of-charge, the output from one or more inverters may quickly drop to zero. This is considered normal operation.
21. Check for faults. If fault condition(s) exist, correct and restart Functional Test.

If the Inverters pass the Functional Test, proceed to Commissioning procedure as defined in XW Inverter/Charger Operation Guide.



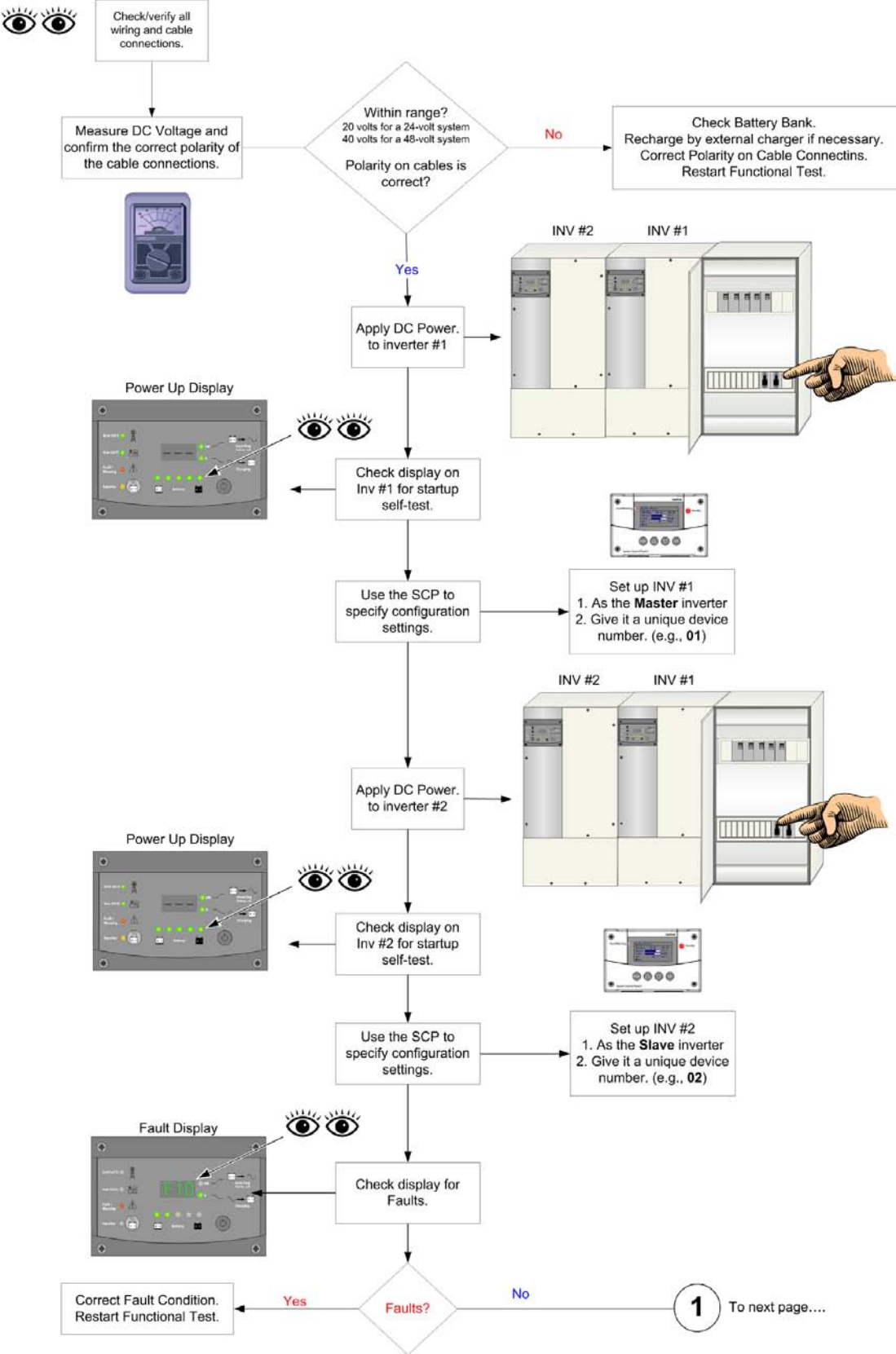


Figure 2-32 Functional Test for Multiple Inverters - Page 1 of 2

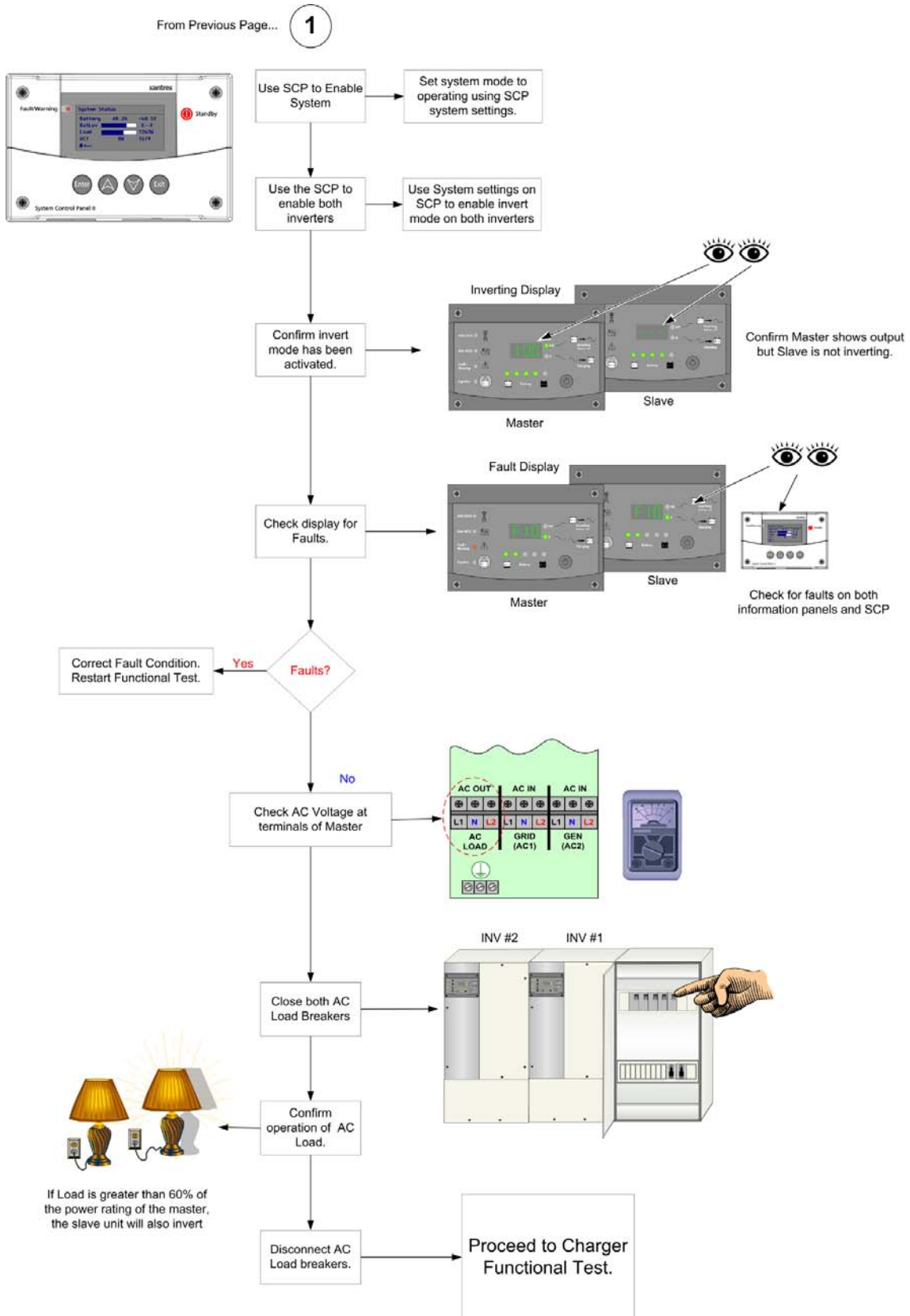


Figure 2-33 Functional Test for Multiple Inverters - Page 2 of 2

# 3

## Xanbus Network Installation

Chapter 3, “Xanbus Network Installation” provides detailed information for planning and installing the components necessary for network communication on a Xanbus system.

| <b>For this Topic</b>    | <b>See....</b> |
|--------------------------|----------------|
| “Xanbus-enabled Devices” | page 3–2       |
| “The Xanbus System”      | page 3–2       |
| “Installing the Network” | page 3–7       |

# Xanbus-enabled Devices

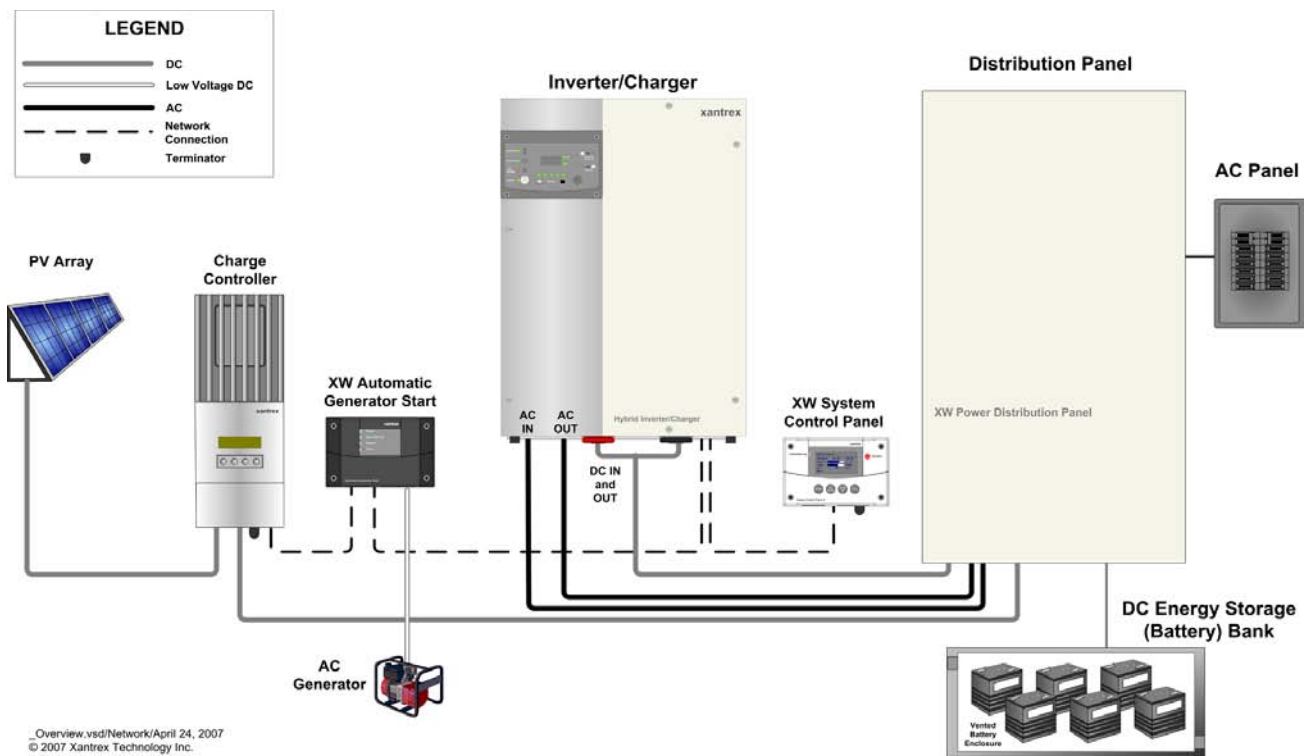
The Xanbus™-enabled designation means that the product works on a Xanbus network. Xanbus-enabled products are:

- Easy to use. The Xanbus network simplifies operation and automates routine tasks.
- Reliable. Software control eliminates errors due to analog signalling.
- Accurate. Digital information is less susceptible to interference and line loss.

## The Xanbus System

**What is a network?** A network is a collection of devices that perform individual functions, but also communicate and interact with the other devices. The network capability of the XW Power System provides a robust, integrated product solution that simplifies and automates the installation, configuration, control, monitoring, and integration of devices that deliver and distribute AC or DC power.

**Network components** Each device is integrated into the network using cables, network connectors, and terminators. An example of a network-managed power system is shown in Figure 3-1.



**Figure 3-1** Network-Managed Power System

**Network configurations** The network can be installed in one of two configurations: as a multi-drop backbone (see Figure 3-5) or as a daisy chain (see Figure 3-6).

## Network Components

A Xanbus network consists of the following components:

- Xanbus-enabled devices—these include the XW System Control Panel, the XW Inverter/Charger, XW Automatic Generator Start, and XW Charge Controller. The maximum number of Xanbus devices connected to a single Xanbus network should not exceed eight devices.
- Xanbus power supply—the network must have at least one device with a power supply to run the network. The total network current supplied by all the power-sourcing devices must be greater than or equal to the total current drawn by the power consuming devices. The power supply must be capable of providing 15 Vdc/200 mA to each device. The XW Inverter/Charger can provide sufficient network power.

For example, in a system with an inverter/charger, a XW System Control Panel and an Automatic Generator Start, the inverter/charger is a power-sourcing device capable of providing 800 mA at 15 Vdc while the two other devices each consume a maximum of 200 mA for a total maximum consumption of 400 mA. In this example, the network is properly configured from a power perspective because the power source is capable of providing more current than is needed: 800 mA > 400 mA.

---

**Important:** See the specifications for each Xanbus device to determine how much power each device consumes or supplies.

---

- Xanbus cables—each Xanbus-enabled device is connected by a Category 5 (CAT 5 or CAT 5e) cable, a standard cable available from Xantrex or any computer supply store. The cable consists of eight conductors in four twisted pairs with an RJ45 modular connector wired to the T568A standard.



### CAUTION: Equipment Damage

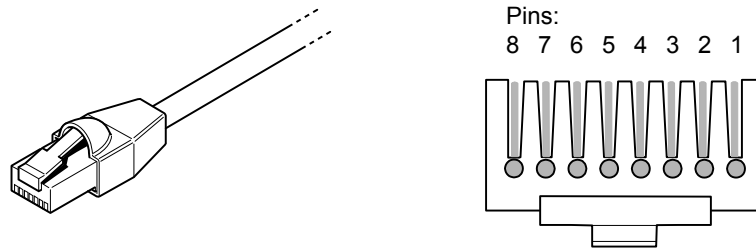
Do not use crossover cable.

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Table 3-1 contains the arrangements of wire colors to pin numbers for the T568A standard.

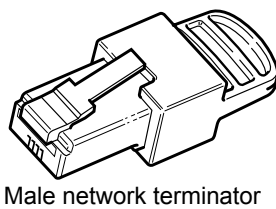
**Table 3-1** T568A Standard Wiring

| Pin Number | Conductor Name | CAT 5 Cable Insulation Color | CAT 5e Cable Insulation Color |
|------------|----------------|------------------------------|-------------------------------|
| 1          | NET_S          | White/Green                  | White/Orange                  |
| 2          | NET_S          | Green                        | Orange                        |
| 3          | NET_C          | White/Orange                 | White/Green                   |
| 4          | CAN_L          | Blue                         | Blue                          |
| 5          | CAN_H          | White/Blue                   | White/Blue                    |
| 6          | NET_C          | Orange                       | Green                         |
| 7          | NET_S          | White/Brown                  | White/Brown                   |
| 8          | NET_C          | Brown                        | Brown                         |

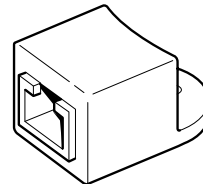


**Figure 3-2** Xanbus Cable and RJ45 Connector Pin Numbers

- Network terminators (Figure 3-3)—the Xanbus network must be properly terminated at each end with male or female network terminators to ensure the communication signal quality on the network. If the network is not properly terminated, signal quality is degraded and performance on the network is reduced. Permanent configuration without terminators is not supported by Xantrex. The XW Series and other Xanbus-enabled devices ship with one male terminator already installed. Depending on your network layout, this terminator may need to be removed and inserted into another device elsewhere in the network.



Male network terminator

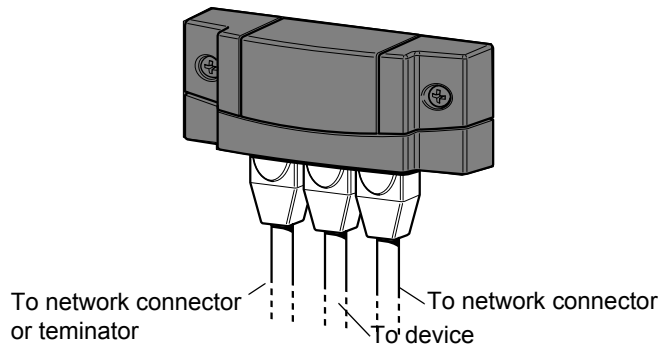


Female network terminator

**Figure 3-3** Network Terminators

- Network connectors—The three-way connector houses three RJ45 inputs that provide a device connection point on a multi-drop backbone layout (see “Multi-Drop Backbone Layout” on page 3–5). All three inputs are wired identically and can accept either Xanbus cables or terminators. One input is available for connecting to a Xanbus-enabled device. The remaining inputs are reserved for connection to other network connectors, a Xanbus cable terminated with a female terminator, or a male terminator.

The network connector is mounted to a bulkhead or a wall, as shown in Figure 3-4.



**Figure 3-4** 3-Way Network Connector (sample configuration)

## Ordering Network Components

Table 3-2 provides a partial list of network components and part numbers. Ready-made cables are available in standard lengths from 3 feet to 75 feet.

For the most up-to-date list, call an authorized Xantrex dealer or visit the Outlet Store at [www.xantrex.com](http://www.xantrex.com).

**Table 3-2** Xanbus Network Components and Part Numbers

| Network Component                         | Part Number |
|---|-------------|
| Network termination — Male (2 per pack)   | 809-0901    |
| Network termination — Female (2 per pack) | 809-0905    |
| 3-way network connector                   | 809-0903    |
| Network cable 3 ft. (0.9 m)               | 809-0935    |
| Network cable 5 feet (1.5 m)              | 809-0936    |
| Network cable 7 feet (2.0 m)              | 809-0937    |
| Network cable 10 feet (3.0 m)             | 809-0938    |
| Network cable 14 feet (4.3 m)             | 809-0939    |
| Network cable 25 feet (7.6 m)             | 809-0940    |
| Network cable 50 feet (15.2 m)            | 809-0941    |
| Network cable 75 feet (22.9 m)            | 809-0942    |

## Network Layouts

Xanbus-enabled devices can be connected in one of two Xanbus network layouts: multi-drop backbone or daisy chain. Each network layout has advantages and disadvantages, depending on the application and/or environment. It is up to the installer or system designer to decide which layout is best for the installation.

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**Important:** Do not mix the two types of network layouts. Mixed configurations are not supported by Xantrex.

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### Multi-Drop Backbone Layout

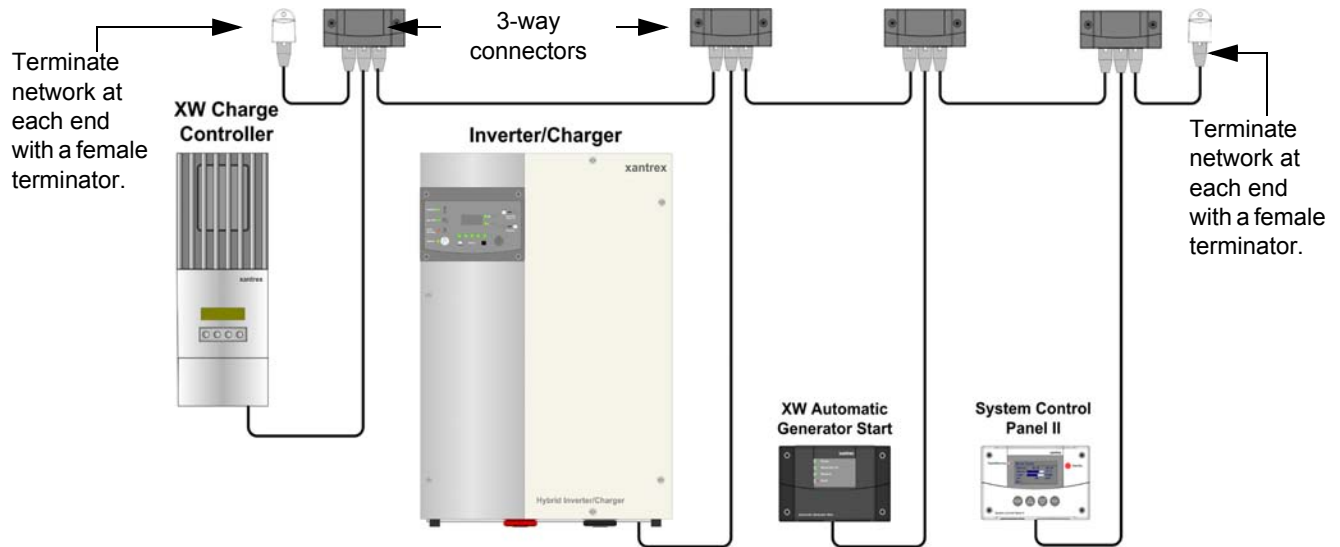
In a multi-drop backbone layout, each Xanbus-enabled device on the network is connected by a drop cable to the network bus or backbone with a network connector, as shown in Figure 3-5.

Terminators are required at both ends of the multi-drop backbone cable, as shown in Figure 3-5. Therefore, the Xanbus-enabled devices do not require their own termination. With only one terminator, the signal quality is degraded and performance on the network is reduced. Permanent configuration with only one terminator is not supported by Xantrex.

If cables are placed at the end of the network, female terminators are required. Otherwise, male terminators can be inserted directly into the open jack of each network connector at the end of the network.

**Advantages** In this layout, Xanbus-enabled devices can be removed or replaced while still keeping the network operating.

**Disadvantage** The main disadvantage of this layout is the cost of the network connectors (a daisy chain layout uses no network connectors). Each device in this layout requires its own network connector.



**Figure 3-5** Multi-Drop Backbone Layout

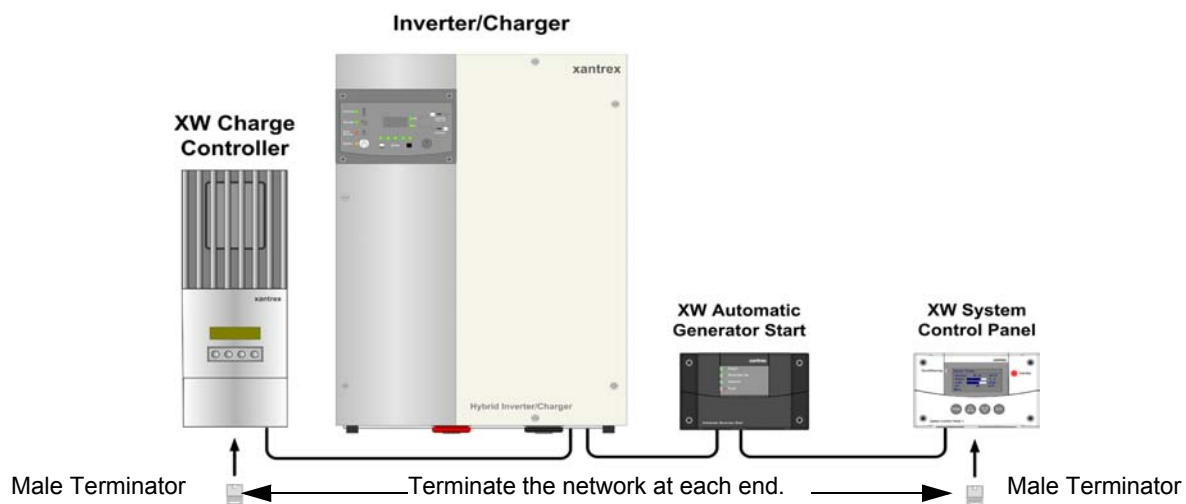
### Daisy Chain Layout

In a daisy chain layout, each device on the network is linked with separate lengths of Xanbus cable, as shown in Figure 3-6. This layout does not require network connectors.

As in the multi-drop backbone layout, two terminators are required to ensure the communication signal quality on the network. The Xanbus-enabled devices at each end of the chain must have a male terminator inserted into their open network ports.

**Advantage** The advantage of this layout is that it is less expensive to install because network connectors are not required.

**Disadvantage** The disadvantage of the daisy chain layout is that Xanbus-enabled devices cannot be removed from the network without interrupting the network. To make the network function after removing a device, you must connect the Xanbus-enabled devices on either side of the missing device to each other or replace the device.



**Figure 3-6** Daisy Chain Network Layout



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# Installing the Network

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**Important:** Do not mix the two types of network layouts. Mixed configurations are not supported by Xantrex.

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**Important:** Installing and replacing Xanbus-enabled devices in an existing system must be performed with the XW Power System in Standby mode. For more information about Standby mode, see the XW System Control Panel Owner's Guide.

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## Before You Begin the Installation

- Read the entire section before installing the network. It's important to plan the installation from beginning to end.
- Assemble all the tools and materials required for the installation.

## Installation Tools and Materials

### Tools

The following tools may be required to install the Xanbus cables.

- Phillips screwdriver, appropriately sized
- Drill and 1/8" bit

### Materials

The following materials may be required to complete your installation.

- CAT 5 or CAT 5e cables (available from Xantrex or computer supply stores)
- Network connectors, if installing multi-drop backbone layout
- # 6 screws, 2 per each network connector installed
- Terminators

## Guidelines for Routing the Xanbus Cables



### **WARNING: Shock hazard**

Do not route the Xanbus cables in the same conduit or panel as the AC and DC power cabling.

---

To ensure maximum performance of your network, follow these guidelines when routing the Xanbus cables.

- Route the cables away from sharp edges that might damage the insulation. Avoid sharp bends in the cable—no less than a 4-inch (100 mm) radius.
- Allow at least 2 ¼ inches (57 mm) of space behind the wall to accommodate the depth of the unit and allow room for the cables to bend.
- Allow for some slack in the cable tension.
- Keep the alignment of wire pairs inside the sheath as straight as possible.
- Allow separation between data and power cables (data cables should only cross a power cable at right angles).
- Do not staple the cable with metal cable staples. Use appropriate hardware fasteners to avoid damage to the cable.
- Support horizontal cables using J hooks or cable trays.

The total length of the network, including all connected Xanbus-enabled devices and the XW Series, cannot exceed 130 feet (40 m). See Table 3-3.

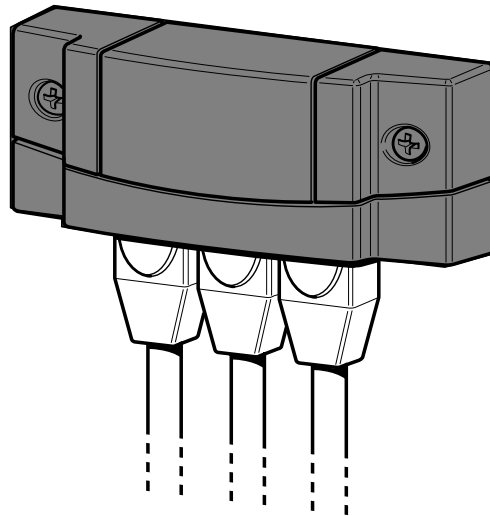
**Table 3-3** Minimum and Maximum Cable Length

| Cable Length                         | Minimum          | Maximum              |
|--------------------------------------|------------------|----------------------|
| Backbone or daisy chain              | 4 inches (10 cm) | 130 feet (40 meters) |
| Total backbone length or daisy chain | 4 inches (10 cm) | 130 feet (40 meters) |
| Drop cable on backbone               | 4 inches (10 cm) | 10 feet (3 meters)   |

## Mounting a Network Connector

**To mount a network connector:**

1. Select an appropriate location with the connector in the recommended mounting orientation, as shown in Figure 3-7.



**Figure 3-7** Recommended Mounting Orientation for Network Connector

2. Mark the position of the mounting screws.
3. Pilot drill the two mounting holes.
4. Fasten the network connector to the mounting surface with two #6 screws.

## Installing Xanbus-Enabled Devices

If you are installing a Xanbus-enabled device on an existing Xanbus System, put the system in Standby mode using the System Settings menu on the XW System Control Panel.



### CAUTION: Equipment Damage

Connect only to other Xanbus compatible devices.

Although the cabling and connectors used in this network system are the same as ethernet connectors, **this network is not an ethernet system**. Equipment damage may result from attempting to connect Xanbus to different systems.

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**Important:** Mount cables and network connectors in a dry location.

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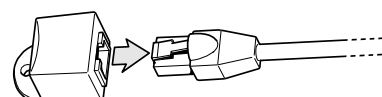
#### To install the Xanbus-enabled devices:

1. Determine and prepare the location for each device. Refer to the installation procedure for each device elsewhere in this manual.
2. Determine and measure the required cable length, taking into consideration your network layout, the routing, and strain relief requirements.  
Do not exceed the total recommended cable length of 130 feet (40 meters).
3. Mount the devices according to the installation procedure elsewhere in this guide.
4. Use an appropriate length of Xanbus cable to connect each device and (if used) 3-way network connector.
5. Terminate the Xanbus network according to “Completing the Multi-Drop Backbone Layout” on page 3–9 or “Completing the Daisy Chain Layout” on page 3–10.

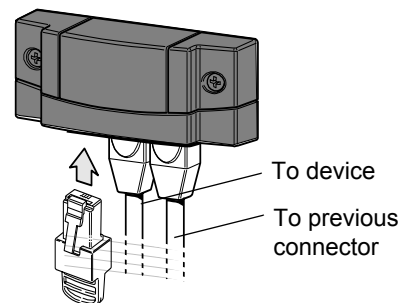
## Completing the Multi-Drop Backbone Layout

#### To complete the multi-drop backbone layout:

- ◆ Attach a female terminator to the backbone cable at each end of the network (see Figure 3-8)
- Or
- ◆ Insert a male terminator into the open jack of the network connector at each end of the network (see Figure 3-8).



Attach female terminator to end of backbone cable.



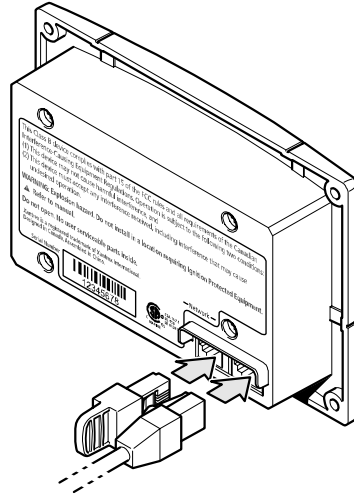
Insert male terminator into open jack of connector.

**Figure 3-8** Options for Completing a Multi-Drop Backbone Layout

## Completing the Daisy Chain Layout

**To complete the daisy chain layout:**

- ◆ Insert a male terminator into the open network port of the Xanbus-enabled device at each end of the network. See Figure 3-9.



**Figure 3-9** Completing a Daisy-Chain Layout



### **CAUTION: Unpredictable device behavior**

After connecting the Xanbus-enabled devices and terminating the network, do not plug terminators or other cables into any remaining open network ports on any Xanbus-enabled devices. Do not connect one end of the network to the other to make a ring.

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# 4

## XW Solar Charge Controller Installation

Chapter 4, “XW Solar Charge Controller Installation” describes how to mount and connect the XW Charge Controller as part of the XW System.

| <b>For this Topic</b>   | <b>See....</b> |
|-------------------------|----------------|
| “PV Array Requirements” | page 4–2       |
| “Mounting”              | page 4–3       |
| “Grounding”             | page 4–8       |
| “Wiring”                | page 4–9       |
| “Commissioning”         | page 4–14      |

## Installing the Charge Controller

This chapter describes installing the XW Solar Charge Controller with the XW Power System, including the power distribution panel. For stand-alone installation, see the XW Solar Charge Controller Owner's Guide.

## PV Array Requirements

Each Charge Controller must be connected to its own PV array. For optimum performance, each individual array must be composed of the same type of solar panel, with the same  $V_{oc}$  and  $V_{mp}$  specifications.

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**Important:** The following information provides only general guidelines. The installation and rated performance of your PV array is subject to inspection and approval by the authority having jurisdiction.

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### Array Size

For PV array sizing guidelines, use the XW Solar Charge Controller PV array sizing tool accessible from [www.xantrex.com/support](http://www.xantrex.com/support).

Although the Solar Charge Controller can harvest a maximum of 3500 W, the PV array size can be as large as 6720 W (based on  $48 \text{ A} \times 140 \text{ Vdc} = \text{W}$ ).

### Array Voltage



#### **CAUTION; Equipment Damage**

The PV array voltage must never exceed  $150 V_{oc}$  (open circuit voltage) under any conditions.

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The maximum PV array voltage for XW Solar Charge Controller MPPT operation is 140 Vdc.

When calculating PV array size for the XW Solar Charge Controller, consider the expected  $V_{oc}$  of the array under all possible conditions. Panel voltage increases with decreasing temperature. The array needs to be sized so that 150 Vdc does not occur, even at the lowest expected panel temperature during open circuit. The panel manufacturer provides a  $V_{oc}$  rating per panel, but it is usually rated at 25 °C (77 °F).

### Array Current

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**Important:** The  $I_{sc}$  (short circuit current) rating of the array must not exceed the 60 A input current rating of the XW Solar Charge Controller at any time.

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Panels rated up to 48 A at 25 °C (77 °F) are recommended to allow for increases in  $I_{sc}$  at low panel temperatures and at solar noon. Ensure that the  $I_{sc}$  rating under all conditions does not exceed 60 A. A factor of 1.25 is applied to the rated  $I_{sc}$  at 25 °C (77 °F) when the panel is colder than -21 °C (70 °F).

## MPPT Voltage Range

The XW Solar Charge Controller maximum power point tracking algorithm maximizes the output power of PV arrays as long as the operating voltage is within the MPPT operational window. Ensure that the PV array used in the system operates within the MPPT operational window.

Effects of array voltages outside of the MPPT operational window are shown in Table 4-1.

**Table 4-1** MPPT Operational Window

| Voltage   | Effect of Array Voltage   | XW Solar Charge Controller Mode |
|---|---|---------------------------------|
| $V_{oc} < Batt_{nom}$<br>(system battery voltage)               | Charge Controller not operating.  | Low Light                       |
| $V_{MPP} = Batt_{nom}$ to 120 Vdc                               | Maximum harvest of solar energy.  | Charging<br>(MPPT window)       |
| $120 \text{ Vdc} < V_{MPP} < 140 \text{ Vdc}$                   | Charge Controller reduces the output current limit to protect the unit from voltage spikes. | Thermal Derating                |
| $V_{MPP} > 140 \text{ Vdc}$<br>(or $V_{oc} > 140 \text{ Vdc}$ ) | Charge Controller shuts down. Unit may be damaged if $V_{oc} > 150 \text{ V}$ .             | Over-voltage fault.             |

## Mounting

The instructions in this section apply to an installation including the power distribution panel. Installation procedures will vary according to your specific application. For special applications, consult a qualified electrician or your Xantrex Certified Dealer.

**Important:** *Installations must be compliant with all local electrical codes.* Installation of this equipment should only be performed by a qualified electrician or by a Certified Renewable Energy (RE) System installer.

## Choosing a Location

The XW Solar Charge Controller is designed to be mounted vertically to the side or the top of the power distribution panel.

The XW Solar Charge Controller must be installed indoors in a dry, protected location away from flammable materials, sources of high temperature, moisture, and vibration, and direct sunlight. The location must also be sheltered from direct sunlight, rain, snow, and wind-blown debris.



### CAUTION: Equipment Damage

Never install the XW Solar Charge Controller where it is exposed to salt water spray. Exposure to salt water will void the warranty and may cause a malfunction or a shock hazard.



**WARNING: Explosion/Corrosion Hazard**

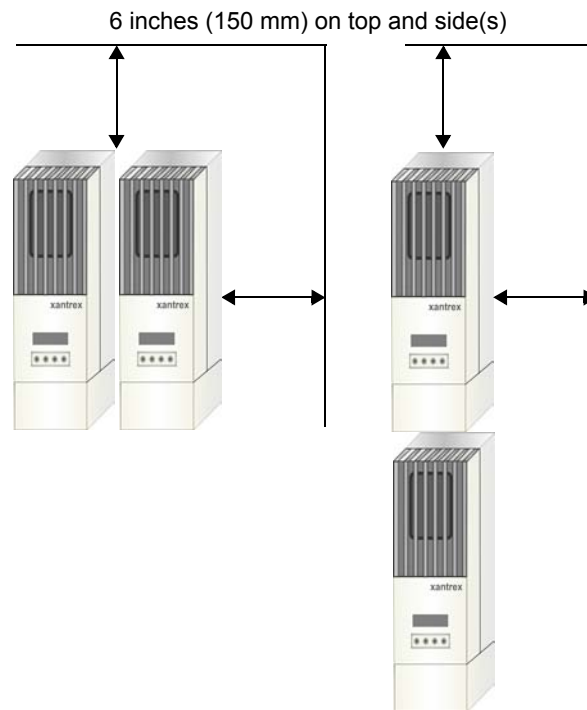
To reduce the risk of fire or explosion, do not install the XW Solar Charge Controller in sealed compartments containing batteries or in locations that require ignition-protected equipment. To reduce the risk of corrosion from hydrogen-sulfide gas vented by batteries, do not install the XW Solar Charge Controller in sealed compartments containing batteries.

If using “sealed” batteries, the controller can be mounted in the same enclosure as long as it is adequately ventilated.

For optimal and safe operation, ensure there is adequate clearance around the XW Solar Charge Controller. See Table 4-2. If clearances are reduced below these minimums, rated performance may not be achieved.

**Table 4-2** Minimum Clearance Requirements

| Location | Minimum Clearance  |
|----------|--|
| Above    | 6 inches (150 mm) When units are mounted to the side of the power distribution panel in a vertical stack, the topmost unit must maintain the minimum clearance to the nearest surface.   |
| In front | Sufficient room to allow for easy access to read the display, to prevent accidental contact with the heat sink, and to perform maintenance.  |
| On sides | 6 inches (150 mm) on at least one side of the overall assembly. A maximum of two units can be mounted side by side or side mounted against the power distribution panel. In both configurations, the minimum clearance around the outermost unit must be maintained. |



**Figure 4-1** Minimum Clearance Requirements



## Removing the Wiring Terminals Cover

Before mounting, you must remove the wiring terminals cover to access the mounting holes and the wiring terminals. The wiring terminals cover is secured with two Phillips #8-32  $\times$  2 1/2-inch screws on the front cover of the unit. See Figure 4-2.

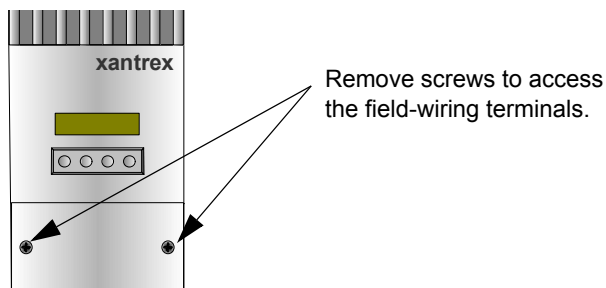


Figure 4-2 Removing the Wiring Terminals Cover

## Removing Knockouts

Six dual and two single knockouts are provided for routing battery, PV array, BTS, and network cables into the XW Solar Charge Controller. Bushings or conduits must be used to protect the wiring from damage from rough edges around the knockout holes.

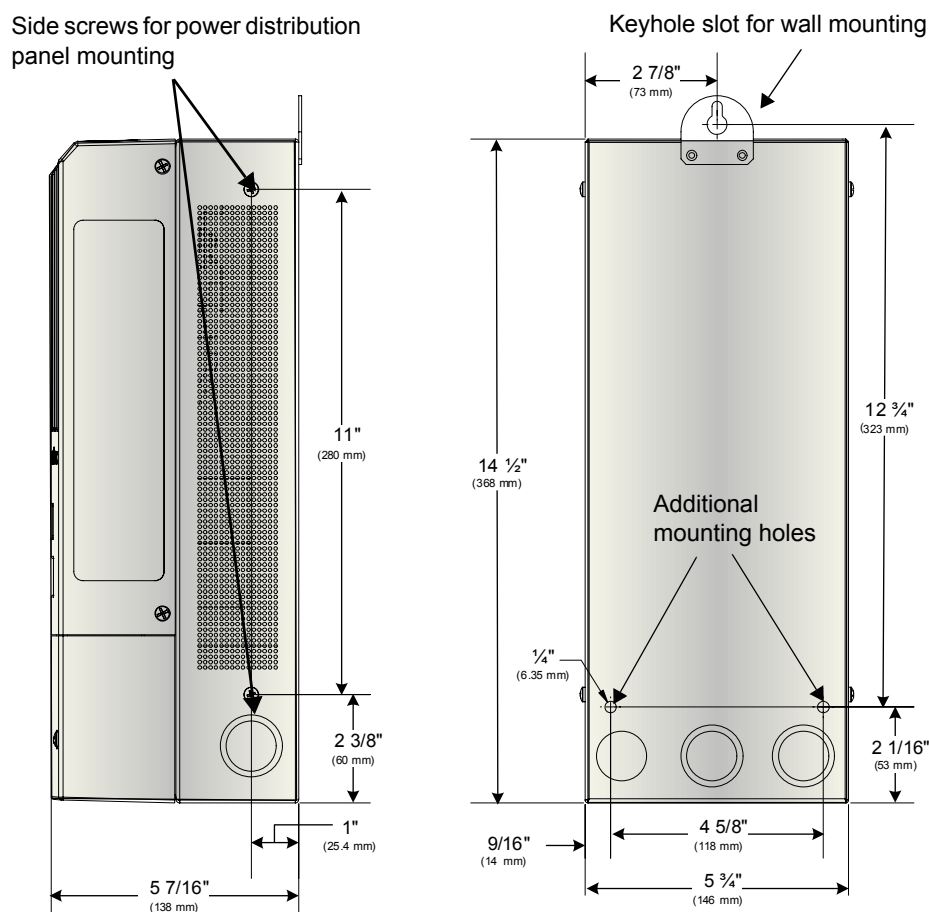


Figure 4-3 Dimensions and Knockout Locations

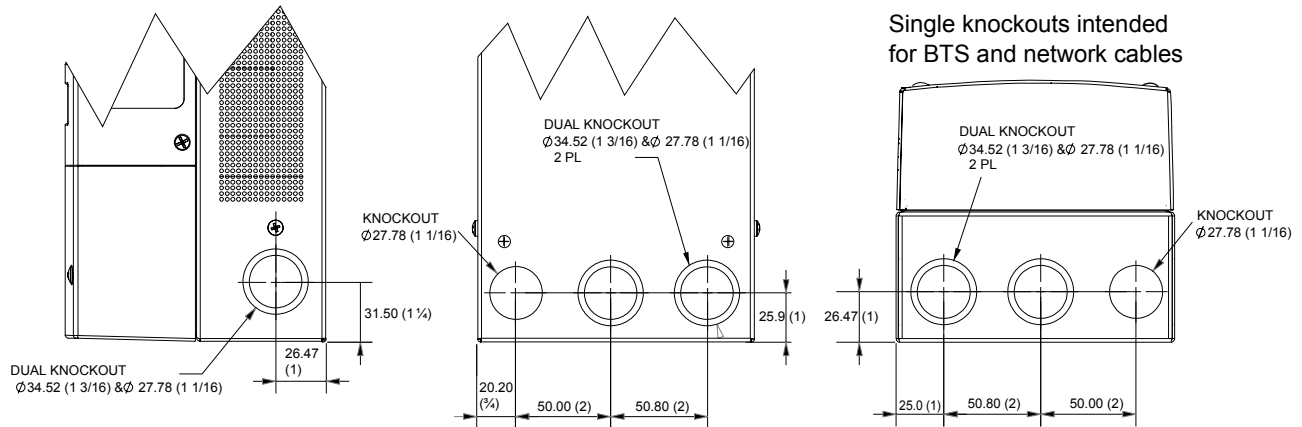


Figure 4-4 Knockout Dimensions

## Mounting the Controller

The XW Solar Charge Controller can be mounted to either the side or the top of the power distribution panel. The power distribution panel has keyhole slots and screw holes for side mounting, and two pairs of conduit holes for top mounting the XW Solar Charge Controller.

### To mount the XW Solar Charge Controller to the side of the power distribution panel:

1. Back out the top side screw on the XW Solar Charge Controller by ¼-inch.
2. Remove the lower side screw on the XW Solar Charge Controller.
3. Holding the unit against the side of the power distribution panel, insert the top side screw into one of the two keyhole slots on the side of the power distribution panel and pull the unit down into the slot.
4. Insert the lower side screw through the hole on the inside of the power distribution panel and into the side of the XW Solar Charge Controller.
5. Tighten the lower side screw to secure the XW Solar Charge Controller.

### To mount the XW Solar Charge Controller to the top of the power distribution panel:

1. Remove a pair of knockouts from the top of the power distribution panel.
2. Remove the bottom knockouts from the XW Solar Charge Controller.
3. Align the knockouts on the power distribution panel and XW Solar Charge Controller, and secure the unit with two locking strain reliefs or threaded connectors.

In a stand-alone installation, the XW Solar Charge Controller is mounted using three #10 × ½-inch or #12 × ½-inch pan-head screws.

### To mount the XW Solar Charge Controller away from the power distribution panel:

1. Remove the wiring terminals cover.
2. Mark the location of the keyhole slot on the wall.
3. Secure the top mounting screw in the location marked. Leave the screw head backed out approximately ¼ inch (6 mm).
4. Place the controller onto the screw and pull it down into the keyhole slot.

5. Insert two screws in the two mounting holes provided to secure the unit to the wall.
6. Provide strain-relief clamps or conduit to prevent damage to the circuit board and terminal block from pulling on the wires.

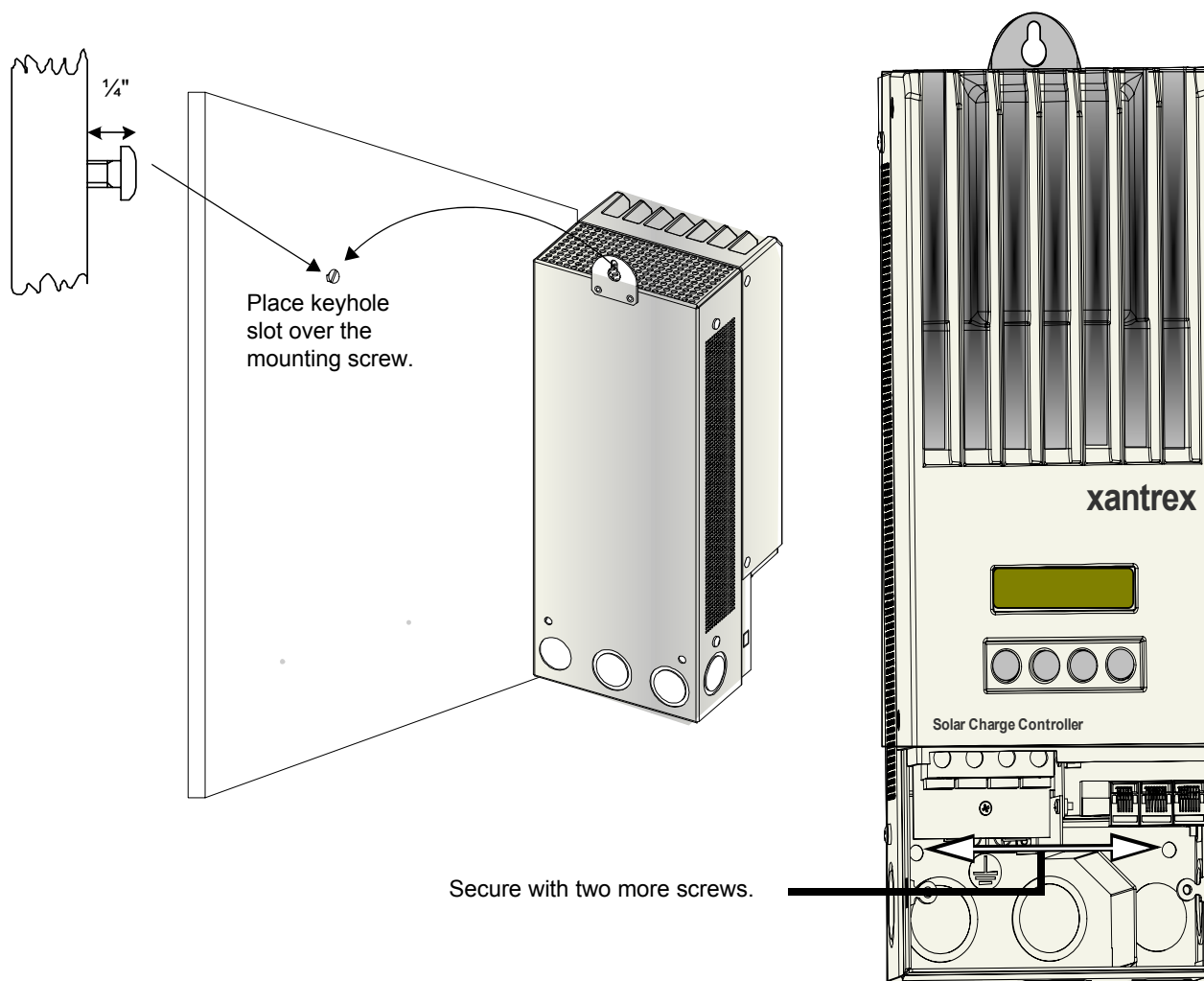


Figure 4-5 Mounting the XW Solar Charge Controller

## Grounding

The XW Solar Charge Controller is designed to work only with negative-grounded electrical systems. Grounding for both PV and battery circuits is provided inside the wiring compartment. Each ground connection can accommodate up to #6 AWG wire size.

A fuse rated at 1 A, 600 V (accessible from inside the wiring compartment) grounds the negative conductor of the PV array and provides PV ground-fault protection (PV-GFP). Replace with Littelfuse KLKD 1 or equivalent.

---

**Important:** Only one Charge Controller is to have the PV-GFP fuse installed in installations with multiple parallel XW Series. Before mounting and connecting the XW Series, remove the PV-GFP fuse from each unit except one.

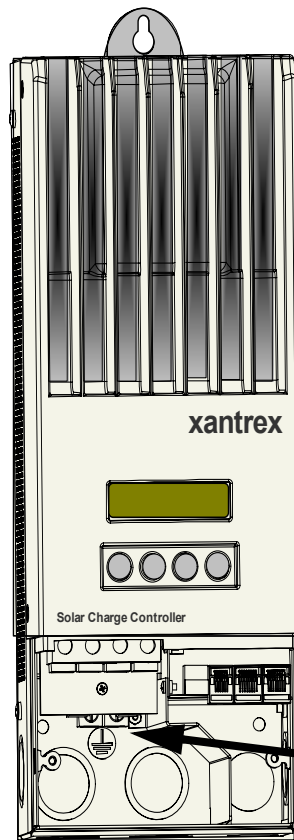
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### WARNING: Shock Hazard

Do not connect the battery negative to ground. NEC requirements specify that the battery negative ground must be done only through the 1A PV-GFP fuse. Bonding the battery negative to ground disables PV ground-fault protection. The battery compartment must only be grounded if it is metal.

---



### WARNING: Fire Hazard

Ensure there is no other ground connection in the DC wiring or the PVGFP will be defeated and will not protect the array from ground fault conditions.



This symbol identifies the protective conductor (grounding) connection.

Chassis ground terminals.  
The PVGFP fuse is located under the power connector circuit board

Figure 4-6 XW Solar Charge Controller Safety Ground Connector



### WARNING: Shock Hazard

Disconnect PV and battery circuits before removing the grounding connection or before removing or installing the PV-GFP fuse.

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## Wiring

**Important:** *Installations must meet all local electrical codes.* Installations of this equipment should only be performed by a qualified electrician or a Certified Renewable Energy (RE) System Installer.



### WARNING: Shock Hazard

Disconnect battery and PV sources before wiring.

## DC Terminal Connector Locations

Terminal connectors for DC wiring are located inside the wiring compartment. The labels above the DC wiring terminals and inside the wiring compartment identify all the connection points. See Figure 4-7.

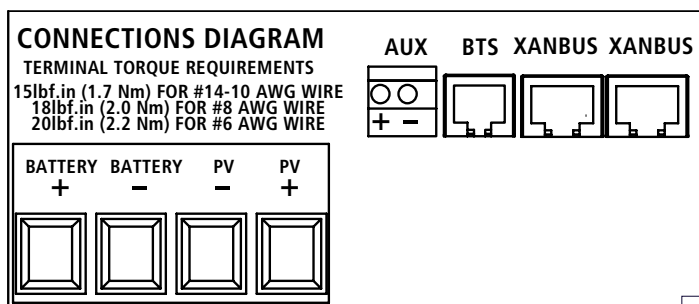


Figure 4-7 DC Connection Terminals

## Wire Size and Over-current Protection Requirements

The wiring, over-current protection devices (fuses and circuit breakers), and installation methods used must conform to all national and local electrical code requirements.

Wiring must be protected from physical damage with conduit or a strain relief clamp.

The BTS, auxiliary output, and network cables must pass through a different conduit than the conduits used for PV wiring and battery cables. Pull the BTS cable through the conduit first as the connector may not fit if other wires have been pulled first.

### Current rating

The XW Solar Charge Controller is rated for 60 A maximum  $I_{sc}$ . Since PV outputs can vary due to the array size or sunlight striking it, the safe minimum wire size must be chosen for maximum array short-circuit current. Consult PV array manufacturer specifications.

### Minimum wire gauge

For installations where the PV array output is the maximum allowable 60 A  $I_{sc}$ , the minimum allowable wire gauge is #6 AWG (13.3 mm<sup>2</sup>) copper wire with a 90 °C (194 °F) insulation rating. This wire gauge is determined by electrical code requirements regarding conduit knockout sizes, wire bending radius, and space available within the XW Solar Charge Controller wiring compartment.

No crimp-on terminals or lugs are required.

### Over-current protection

Over-current protection must be installed for the battery and PV circuits to protect the XW Solar Charge Controller from short circuits at its input and output. The NEC requires all circuits to be protected with a device rated for 125% of the rating of the circuit.

**Table 4-3 Recommended Circuit Breakers for the XW Solar Charge Controller**

| Xantrex Part Number | Description  |
|---------------------|--|
| 865-1065            | Master Pack - Qty 6, Breaker 250A, 160 Vdc, Stud Terminal, Panel Mount, UL/CSA |
| 865-1070            | Master Pack - Qty 12, Breaker 80A, 125 Vdc, Panel Mount, UL/CSA                |
| 865-1075            | Master Pack - Qty 48, Breaker 60A, 160 Vdc, Panel Mount, UL/CSA                |

**Battery Circuit**

The DC-rated fuse or circuit breaker between the battery and the XW Solar Charge Controller must have a maximum size of  $1.25 \times 60$  A (the maximum current rating of the XW Solar Charge Controller). That is, the fuse or circuit breaker must be rated equal to or above 75 A.

**PV Circuit**

The DC-rated fuse or circuit breaker between the PV array and the XW Solar Charge Controller must be rated for the  $I_{sc}$  of the array but will not exceed the 60 A rating.

Long-distance wire runs

If there is a significant distance between the PV array and the XW Solar Charge Controller or between the XW Solar Charge Controller and the battery, larger wires can be used to reduce the voltage drop and improve performance. Refer to Table 4-4 or Table 4-5.



**WARNING: Equipment damage**

Do not connect an array capable of delivering over 60 A  $I_{sc}$  to the XW Solar Charge Controller. Wires larger than #6 AWG can be used only to reduce power loss in the wiring.

To use a larger size wire, use a splicer block (terminal block) approved and rated for this application. This allows the larger cable size from the batteries to be “spliced” to the #6 AWG wire connected to the XW Solar Charge Controller. The splicer block must be installed outside of the XW Solar Charge Controller wiring compartment.

Follow manufacturer’s recommendations for torque and mounting. Splicer blocks and split-bolt kerneys are available from renewable energy suppliers.

**Important:** Local and national electrical codes must be followed for determining additional installation requirements.

Larger wire sizes may be used to improve performance, but may not be installed directly into this Charge Controller. Use a splicer block as previously described.

Maximum one-way distance and wire size

Refer to Table 4-4 or Table 4-5 and find the maximum current in the left column, and the one-way distance from the PV array to the XW Solar Charge Controller (or the distance from the XW Solar Charge Controller to the battery) on the same line, then read the wire size required at the top of the column.

**Table 4-4 One-Way Wire Distance and Wire Size for a 24 Vdc System**

**Maximum one-way wire distance for a < 3% voltage drop assuming 60 Adc charging current  
For 24 Vdc systems**

| Amps | Distance in feet (meters) |             |              |              | Distance in feet (meters) <sup>a</sup> |               |               |               |               |
|------|---------------------------|-------------|--------------|--------------|--|---------------|---------------|---------------|---------------|
|      | 12 AWG                    | 10 AWG      | 8 AWG        | 6 AWG        | 4 AWG                                  | 3 AWG         | 2 AWG         | 1 AWG         | 1/0 AWG       |
| 10   | 17.6 (5.36)               | 28.0 (8.54) | 44.4 (13.54) | 70.6 (21.52) | 112.2 (34.2)                           | 141.8 (43.22) | 179.2 (54.62) | 225.0 (68.58) | 283.4 (86.38) |
| 12   | 14.6 (4.46)               | 23.2 (7.08) | 37.0 (11.28) | 58.8 (17.92) | 93.4 (18.46)                           | 118.2 (36.02) | 149.2 (45.48) | 187.4 (57.12) | 236.2 (72.00) |
| 14   | 12.6 (3.84)               | 20.0 (6.10) | 31.8 (9.70)  | 50.4 (15.36) | 80.2 (24.44)                           | 101.2 (30.84) | 128.0 (39.02) | 160.8 (49.02) | 202.4 (61.70) |
| 16   | 11.0 (3.36)               | 17.4 (5.30) | 27.8 (8.48)  | 44.2 (13.48) | 70.0 (21.34)                           | 88.6 (27.0)   | 112.0 (34.14) | 140.6 (42.86) | 177.2 (54.02) |
| 18   | 9.8 (2.98)                | 17.6 (4.76) | 24.8 (7.56)  | 39.2 (11.94) | 62.4 (19.02)                           | 78.8 (24.02)  | 99.6 (30.36)  | 125.0 (38.10) | 157.4 (47.98) |
| 20   | 8.8 (2.68)                | 14.0 (4.26) | 22.2 (6.76)  | 35.2 (10.72) | 56.0 (17.06)                           | 70.8 (21.58)  | 89.6 (27.32)  | 112.4 (34.26) | 141.8 (43.20) |
| 25   |                           | 11.2 (3.42) | 17.8 (5.42)  | 28.2 (8.60)  | 44.8 (13.66)                           | 56.6 (17.26)  | 71.6 (21.82)  | 90.0 (27.44)  | 113.4 (34.56) |
| 30   |                           | 9.4 (2.86)  | 14.8 (4.52)  | 23.6 (7.20)  | 37.4 (11.4)                            | 47.2 (14.38)  | 59.8 (18.22)  | 75.0 (22.86)  | 94.4 (28.78)  |
| 35   |                           |             | 12.8 (3.90)  | 20.2 (6.16)  | 32.0 (9.76)                            | 40.4 (12.32)  | 51.2 (15.6)   | 64.2 (19.56)  | 81.0 (24.68)  |
| 40   |                           |             | 11.2 (3.42)  | 17.6 (5.36)  | 28.0 (8.54)                            | 35.4 (10.78)  | 44.8 (13.66)  | 56.2 (17.12)  | 70.8 (24.58)  |
| 45   |                           |             |              | 15.6 (4.76)  | 25.0 (7.62)                            | 31.4 (9.58)   | 39.8 (12.14)  | 50.0 (15.24)  | 63.0 (19.20)  |
| 50   |                           |             |              | 14.2 (4.32)  | 22.4 (6.82)                            | 28.4 (8.66)   | 35.8 (10.92)  | 45.0 (13.72)  | 56.6 (17.26)  |
| 60   |                           |             |              | 12.6 (3.84)  | 18.6 (5.66)                            | 23.6 (7.20)   | 29.8 (9.08)   | 37.4 (11.4)   | 47.2 (14.38)  |

a. These wire sizes are not approved by UL to be installed in the controller, but may be used external to the controller (using a splicer block) to reduce voltage drop and improve performance.

**Table 4-5 One-Way Wire Distance and Wire Size for a 48 Vdc System**

**Maximum one-way wire distance for a < 3% voltage drop assuming 60 Adc charging current  
For 48 Vdc systems**

| Amps | Distance in feet (meters) |               |               |               | Distance in feet (meters) <sup>a</sup> |                |                |                |                 |
|------|---------------------------|---------------|---------------|---------------|--|----------------|----------------|----------------|-----------------|
|      | 12 AWG                    | 10 AWG        | 8 AWG         | 6 AWG         | 4 AWG                                  | 3 AWG          | 2 AWG          | 1 AWG          | 1/0 AWG         |
| 10   | 70.4 (21.44)              | 112.0 (34.16) | 177.6 (54.16) | 282.4 (86.80) | 448.8 (136.8)                          | 567.2 (172.88) | 716.8 (218.48) | 900.0 (274.32) | 1133.6 (345.52) |
| 12   | 58.4 (17.84)              | 92.8 (28.32)  | 148.0 (45.12) | 235.2 (71.68) | 373.6 (113.84)                         | 472.8 (144.08) | 596.8 (181.92) | 749.6 (228.48) | 944.8 (288.00)  |
| 14   | 50.4 (15.36)              | 80.0 (24.40)  | 127.2 (38.8)  | 201.6 (61.44) | 320.8 (97.76)                          | 404.8 (123.36) | 512.0 (156.08) | 643.2 (196.08) | 809.6 (246.80)  |
| 16   | 44.0 (13.44)              | 69.6 (21.20)  | 111.2 (33.92) | 176.8 (53.92) | 280.0 (85.36)                          | 354.4 (108.00) | 448.0 (136.56) | 562.4 (171.44) | 708.8 (216.08)  |
| 18   | 39.2 (11.92)              | 70.4 (19.04)  | 99.2 (30.24)  | 156.8 (47.76) | 249.6 (76.08)                          | 315.2 (96.08)  | 398.4 (121.44) | 500.0 (152.40) | 629.6 (191.92)  |
| 20   | 35.2 (10.72)              | 56.0 (17.04)  | 88.8 (27.04)  | 140.8 (42.88) | 224.0 (68.24)                          | 283.2 (86.32)  | 358.4 (109.28) | 449.6 (137.04) | 567.2 (172.80)  |
| 25   |                           | 44.8 (13.68)  | 71.2 (21.68)  | 112.8 (34.40) | 179.2 (54.64)                          | 226.4 (69.04)  | 286.4 (87.28)  | 360.0 (109.76) | 453.6 (138.24)  |
| 30   |                           | 37.6 (11.44)  | 59.2 (18.08)  | 94.4 (28.80)  | 149.6 (45.60)                          | 188.8 (57.52)  | 239.2 (72.88)  | 300.0 (91.44)  | 377.6 (115.12)  |
| 35   |                           |               | 51.2 (15.60)  | 80.8 (26.64)  | 128.0 (39.04)                          | 161.6 (49.28)  | 204.8 (62.40)  | 256.8 (78.24)  | 324.0 (98.72)   |
| 40   |                           |               | 44.8 (13.68)  | 70.4 (21.44)  | 112.0 (34.16)                          | 141.6 (43.12)  | 179.2 (54.64)  | 224.8 (68.48)  | 283.2 (86.32)   |
| 45   |                           |               |               | 62.4 (19.04)  | 100.0 (30.48)                          | 125.6 (38.32)  | 159.2 (48.56)  | 200.0 (60.96)  | 252.0 (76.80)   |
| 50   |                           |               |               | 56.8 (17.28)  | 89.6 (27.28)                           | 113.6 (34.64)  | 143.2 (43.68)  | 180.0 (54.88)  | 226.4 (69.04)   |
| 60   |                           |               |               | 50.4 (15.36)  | 74.4 (22.64)                           | 94.4 (28.80)   | 119.2 (36.32)  | 149.6 (45.60)  | 188.8 (57.52)   |

a. These wire sizes are not approved by UL to be installed in the controller, but may be used external to the controller (using a splicer block) to reduce voltage drop and improve performance.

## Connecting the XW Solar Charge Controller to the Distribution Panel

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### **WARNING: Shock Hazard**

Whenever a PV array is exposed to light, a shock hazard exists at the output wires or exposed terminals. To reduce the risk of shock during installation, cover the array with an opaque (dark) material before making the connections. PV arrays generate voltage whenever light strikes the surface of the array. Before connecting the XW Solar Charge Controller, cover the array to prevent any current from being generated.



### **WARNING: Shock Hazard**

Do not connect the battery negative to ground. Bonding the battery negative to ground disables PV ground-fault protection.

---

### **To connect the XW Solar Charge Controller:**

1. Connect the PV array's positive (+) output to the PV array disconnect.
2. Route another (+) cable from the other end of the PV disconnect to the terminal marked PV + in the XW Solar Charge Controller.
3. Connect the PV array's negative (-) output to the terminal marked PV - in the XW Solar Charge Controller.
4. Connect a positive (+) cable from the terminal marked BAT + to the battery disconnect.
5. Connect a second positive (+) cable to the other side of the battery disconnect and connect to the positive (+) battery terminal.
6. Connect the negative (-) battery cable to the terminal marked BAT - in the XW Solar Charge Controller.
7. Torque the Charge Controller terminals as follows.
  - 15 inch-pounds (1.7 Nm) for #14–10 AWG wire
  - 18 inch-pounds (2.0 Nm) for #8 AWG wire
  - 20 inch-pounds (2.2 Nm) for #6 AWG wire.

Be careful not to overtighten. Allow some slack on the cables within the controller and secure the wiring with strain reliefs or cable clamps.

See Figure 4-8.



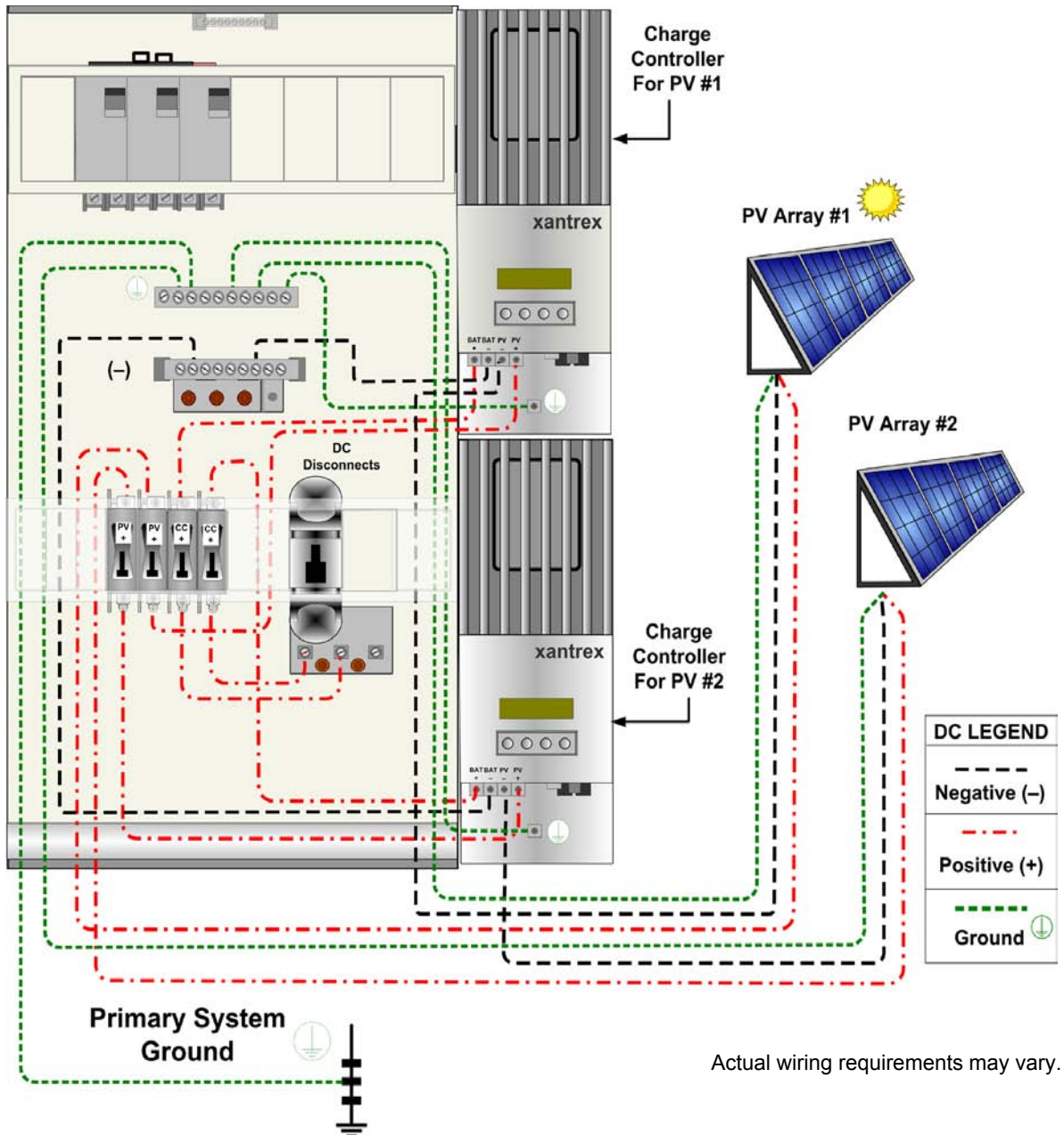


Figure 4-8 Connecting Solar DC Sources in the Power Distribution Panel

## Commissioning

During commissioning, the XW Solar Charge Controller prompts the installer to enter important system information such as the nominal battery voltage, battery type, and battery bank capacity. Ensure the system information is available prior to commissioning.

If a XW System Control Panel is present, the XW System Control Panel is intended to be the configuration interface, so the prompt screens are suppressed. If you prefer to configure using the prompt screens, disconnect the Xanbus cable connecting the XW System Control Panel from the XW Solar Charge Controller before powering up for the first time.

## Configuration Screens

When power is first applied to the XW Solar Charge Controller, several configuration screens prompt you to enter the following information:

- A “DC out” (battery) connection, which enables the XW Solar Charge Controller to read and share the same battery information with other Xanbus-enabled devices that charge or invert from the same battery bank.
- Battery type: Flooded (default), Gel, AGM, Custom.

If you select Custom, the settings for battery type match the default settings for Flooded batteries until you reconfigure the settings on the Custom Battery menu.

- Nominal battery voltage of the battery bank connected to the XW Solar Charge Controller.

The XW Solar Charge Controller automatically detects battery voltages of 12 V, 24 V and 48 V. If your nominal system voltage is 36 V or 60 V, enter the correct system voltage on this screen.

- Battery bank capacity, in amp-hours.

## Commissioning Units Using a XW System Control Panel

In systems where an XW System Control Panel (SCP) is present, the SCP is intended to be the configuration interface. For information about SCP navigation and menus, see Appendix B, “XW System Control Panel Menus in the XW Inverter/Charger Operation Guide.

Commissioning units using an SCP involves three separate procedures:

1. Setting the Device Numbers for all XW Solar Charge Controllers.
2. Configuring Connections and Charger Settings for the first XW Solar Charge Controller.
3. Copying settings from the first unit to the other XW Solar Charge Controller.

**To set the Device Numbers for all XW Solar Charge Controllers:**

1. Ensure power is applied to the XW System Control Panel.
2. Close the DC disconnect or use a selector switch to apply battery power to all of the XW Solar Charge Controllers at the same time. When the XW Solar Charge Controllers are powered up, they will detect that an SCP is already operating on the network, and be ready for configuration through the SCP. Do not apply PV power at this point.

3. From the Select Device menu on the SCP, select a XW Solar Charge Controller (each unit should appear as “MPPT60 00” where the 60 stands for 60A, and the 00 is its device number).
4. On the MPPT Setup menu, ensure the Advanced Settings item is displayed. If Advanced Settings are not displayed (and Basic Settings appears as the last item on the menu), press the up arrow, down arrow and Exit keys together. (See “Advanced menu” on page B-7 of the XW Inverter/Charger Operation Guide.)
5. Select Advanced Settings, then select the Multi Unit Config menu. After entering the Multi Unit Config menu, the LCD backlight on the XW Solar Charge Controller to be configured will flash.
6. On the Multi Unit Config menu, select Dev Number and set it to a number other than 00.  
The device number can be set to any number between 01 and 31. For the first XW Solar Charge Controller, 01 is recommended. If you have two charge controllers, simply set them to 01 and 02.
7. Press Exit until the Select Device menu is displayed.  
The XW Solar Charge Controller now appears as MPPT60 01 on the menu.
8. Repeat steps 3 through 7 for the next XW Solar Charge Controller.  
When you have set the device number for all XW Solar Charge Controllers, you can configure Connections and Charger Settings for the first XW Solar Charge Controller.

**To configure Connections and Charger Settings for the first XW Solar Charge Controller:**

1. On the Select Device Menu, select “MPPT60 01.”
2. Navigate to the Multi Unit Config menu and select Connections.  
On the Connections menu, you can configure PV In (PV input) and DC Conn (DC output, or the battery bank). If the system has only one battery bank, leave DC Conn at the default setting. The PV In setting allows you to differentiate which array is going to which XW Solar Charge Controller. This setting is used for status reporting only, not for any internal controls. Setting PV In to a non-default value is optional.
3. Press Exit twice to leave the Connections menu and Multi Unit Config menu.
4. From the Advanced Settings menu, select Charger Settings.
5. Set the Battery Type, Battery Capacity, and any other charger settings required for your system.  
While in the Charger menu, ensure that the Nominal Battery Voltage is set correctly (it is shown as Batt Voltage and appears as the last item on the menu). If you select “Custom” for your Battery Type, you can further configure the Bulk, Absorption, Float and other settings for the charge cycle.  
The first charge controller should now be configured properly for your system.  
If multiple charge controllers are installed, you can now copy the first unit’s configuration over to other units.

**To copy the XW Solar Charge Controller setup to another unit:**

1. On the SCP, press Exit to leave the Advanced Settings menu and view the Select Device menu.
2. On the Select Device Menu, select the next XW Solar Charge Controller for configuration.

3. On the Advanced Settings menu, select Copy From, then select the XW Solar Charge Controller you want to copy from. You should select the unit with the device number that matches the first unit you configured.

4. Press Enter.

The settings are automatically copied from the selected unit.

---

**Note:** The Copy From command will not give you any indication that it has completed its task. However, you can quickly check for yourself that the charger settings you have chosen have been copied properly by viewing some of the settings you originally configured.

---

5. Uncover the PV array and/or apply power with the disconnect or selector switch.

The XW Solar Charge Controller starts up in sleep mode and waits for a short period to determine that the input voltage is greater than the output voltage. After the input voltage exceeds the output voltage by the required margin for 10 seconds, the unit begins operating.

# 5

## XW System Accessories Installation

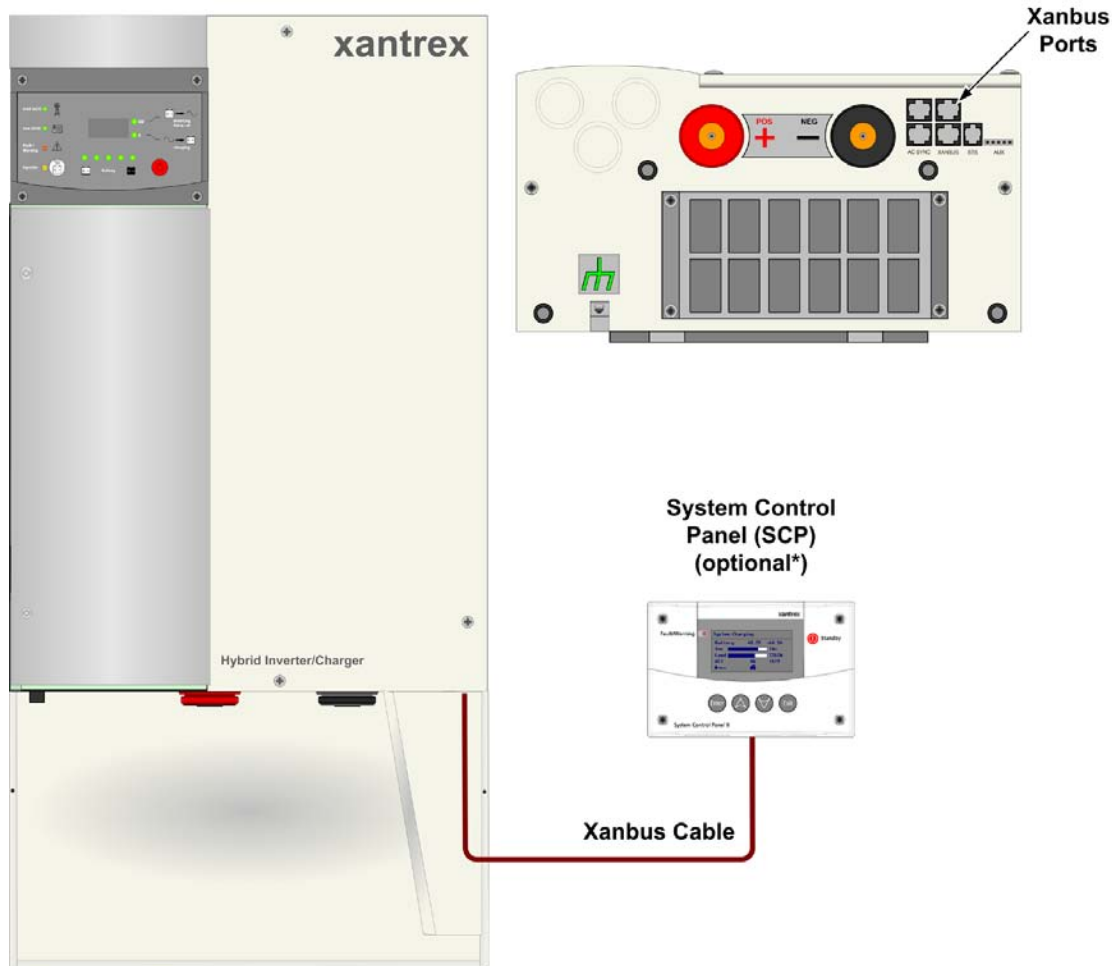
Chapter 5, “XW System Accessories Installation” describes how to mount and install the XW System Control Panel and the Automatic Generator Start.

| <b>For this Topic</b>              | <b>See....</b> |
|------------------------------------|----------------|
| “The XW System Control Panel”      | page 5–2       |
| “The XW Automatic Generator Start” | page 5–7       |

## The XW System Control Panel

The XW Series Inverter/Charger can be controlled remotely by connecting a XW System Control Panel. The XW System Control Panel is optional for single inverter systems. The XW System Control Panel is required for configuring systems with multiple inverters. The XW System Control Panel allows access to programming features of the inverter and allows the system to be modified to specific installation requirements.

The XW System Control Panel is connected to the inverter through one of two Xanbus ports.



**Figure 5-1** XW System Control Panel Xanbus Port Locations

The XW System Control Panel is designed to be wall mounted (see “Mounting the XW System Control Panel” on page 5–3), and requires no connections other than the network cables or terminators that plug into the back of the unit.

Because you cannot access the XW System Control Panel network inputs after the unit is mounted, the network cables need to be routed through the wall and connected before securing the XW System Control Panel.

See Chapter 3, “Xanbus Network Installation”, for more information about installing a Xanbus-enabled device as part of a network-managed power system.

---

## Materials and Tools Required

You will need these materials and tools to complete the installation:

- Mounting template sticker (supplied)
- Mounting plate (supplied)
- mounting plate (supplied)
- Four #6 screws (supplied)
- Two #8 screws (supplied)
- Cable clamps or hardware fasteners
- Xantrex network cables or equivalent (CAT 5 or CAT 5E cable with RJ45 connectors wired to T568A standard) A 7-foot cable is provided.
- Xantrex male network terminator (supplied).
- Phillips head screwdriver
- Jigsaw or small keyhole saw
- Power drill with 1/8" bit (optional)

## Choosing a Location

Choose a location that is easily accessible. The XW System Control Panel should be mounted where you can have unobstructed access to the screen and buttons.

The location should be indoors, dry, and free from corrosive or explosive fumes.



### **WARNING: Explosion hazard**

The XW System Control Panel is not Ignition Protected. Do not install in areas requiring Ignition-Protected equipment, such as areas containing gasoline engines, tanks, or fuel-line fittings.

---

## Mounting the XW System Control Panel

The XW System Control Panel can be mounted three ways:

- Flush mounted through an opening in a wall using the mounting plate
- Surface mounted using the mounting plate
- Flush mounted through an opening in a wall and secured with four #6 screws.



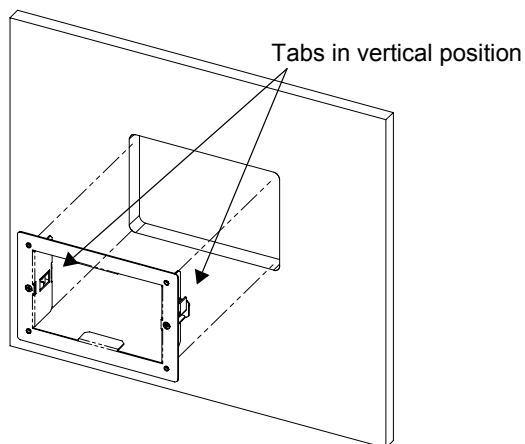
### **WARNING: Shock hazard**

Before making an opening in a wall or panel, ensure there is no wiring or other obstruction within the wall.

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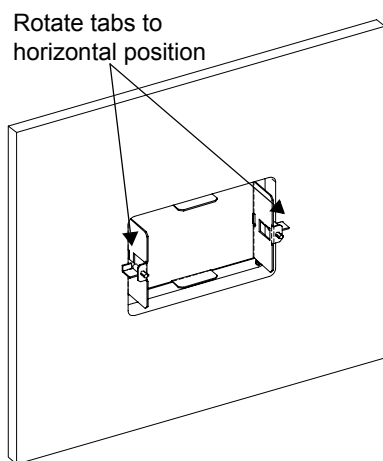
#### **To flush mount the XW System Control Panel with mounting plate:**

1. Using a jigsaw and the supplied template sticker as a guide, cut out the hole for the mounting plate. The mounting plate fastens to walls up to 3/4 inch (19 mm) thick.
2. Route the network cable from the GT Inverter inside the wall and through the opening.
3. Insert the mounting plate with the two tabs in a vertical position into the hole (see Figure 5-2).



**Figure 5-2** Inserting the Mounting Plate

4. Secure the mounting plate by tightening the two screws to rotate the tabs to the horizontal position (see Figure 5-3) and pull the tabs tight against the inner surface of the wall. Be careful not to overtighten the screws and damage the wall.



**Figure 5-3** Securing the Mounting Plate

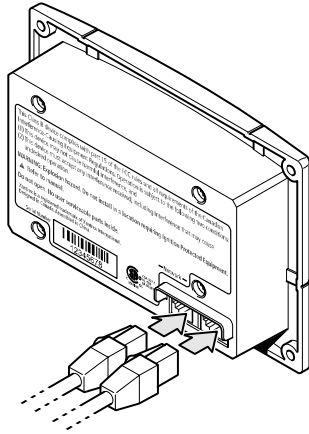
5. Connect the network cable(s) (and terminator if necessary) to either input on the back of the XW System Control Panel. See Figure 5-4.  
Connect a network terminator to the XW System Control Panel if it is the last device at the end of a series-type network layout.

---

**Important:** To ensure communication signal quality, the network **must** be terminated at each end with a terminator.

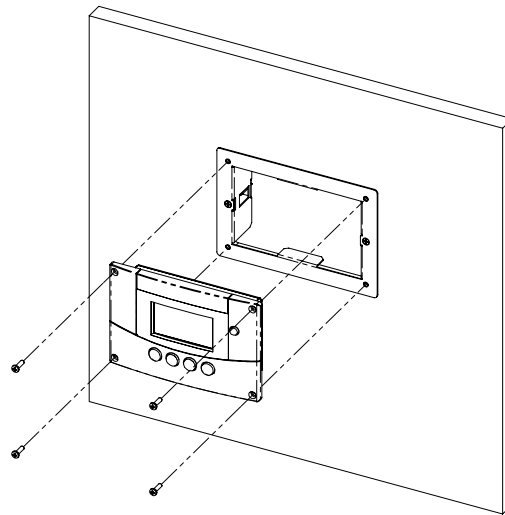
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**Figure 5-4** Connecting the Network Cables

6. Place the unit into the mounting plate and secure it with four #6 screws.



**Figure 5-5** Securing the XW System Control Panel

7. Peel off the protective plastic coating covering the screen and indicator light.

**To flush mount the XW System Control Panel with no mounting plate:**

1. Peel the backing from the supplied mounting template sticker and place it in your chosen installation location. Use the template to mark the location for the area to be cut out.
2. Pilot-drill the mounting holes (if necessary, depending on your mounting surface) and, using a jigsaw, cut out the hole in which the XW System Control Panel will be inserted.
3. Route the network cable(s) from other Xanbus-enabled devices inside the wall and through the opening.



### CAUTION: Equipment damage

Connect the XW System Control Panel only to other Xanbus-enabled devices.

Although the cabling and connectors used in this network system are the same as Ethernet connectors, **this network is not an Ethernet system**. Equipment damage may result from attempting to connect these two different systems.

4. Connect the network cable(s) (and terminator if necessary) to either input on the back of the XW System Control Panel. See Figure 5-4.

Connect a network terminator to the XW System Control Panel if it is the last device at the end of a series-type network layout.

5. Place the unit in the opening and secure it with four #6 screws.
6. Peel off the protective plastic coating covering the screen and indicator light.

#### To surface mount the XW System Control Panel:

1. Using the supplied template sticker as a guide, mark the locations for two mounting screws and the access hole for the network cables.
2. Using a hole saw, cut out the access hole for the network cable(s).
3. Route the network cable(s) from other Xanbus-enabled devices inside the wall and through the access hole.
4. Attach the mounting plate with two #6 screws.
5. Connect the network cable(s) (and terminator if necessary) to either input on the back of the XW System Control Panel.

Connect a network terminator to the XW System Control Panel if it is the last device at the end of a series-type network layout.

6. Place the unit into the mounting plate and secure it with four #6 screws. See Figure 5-6.
7. Peel off the protective plastic coating covering the screen and indicator light.

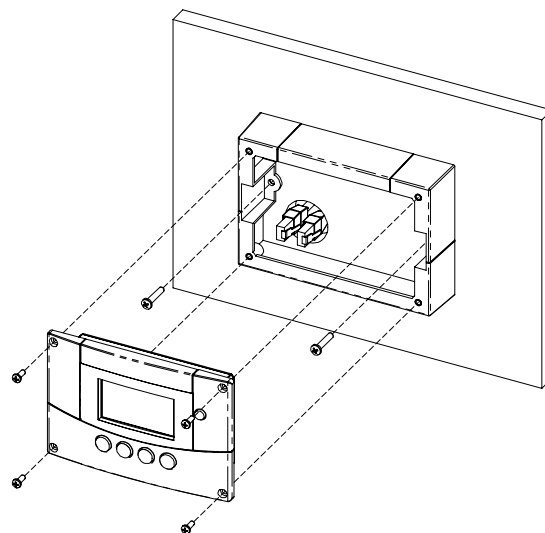


Figure 5-6 Surface Mounting the XW System Control Panel

## Verifying the Installation

If network power (from an inverter/charger) is present, the backlight will come on and the XW System Control Panel will show the startup screen (see the XW Inverter/Charger Operation Guide), then show the System Home screen.

## The XW Automatic Generator Start

Some generators allow automatic starting. Connecting an Automatic Generator Start to the generator and to the Xanbus network is required for the XW System to benefit from automatic generator start/stop capability.



### WARNING: Shock Hazard

Auto-start generators can start automatically at any time.

Affix the warning labels (supplied with the XW Automatic Generator Start) regarding auto-start generators on or near the main AC distribution panel and near the generator.

The AGS connects to:

- Inverter/Charger's Xanbus port
- Generator

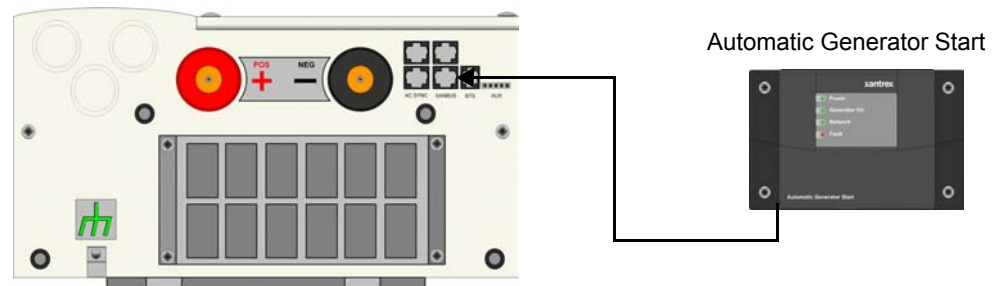


Figure 5-7 Connecting the AGS Communications Cable to the XW Series

## Preparing an Installation

Before installing the XW Automatic Generator Start Module, consider how and where the unit will be mounted. Pre-plan the connection routes between the XW Automatic Generator Start, the generator, thermostats, and the XW Automatic Generator Start. Refer to the XW AGS Owner's Guide for additional information.

See Chapter 3, "Xanbus Network Installation", for more information about installing a Xanbus-enabled device as part of a network-managed power system.

## Materials and Tools Required

The following tools and materials may be needed to install the XW Automatic Generator Start:

- Mounting template (supplied)
- Wiring harness (Xantrex part number 809-0917, supplied)
- Four #6 screws, 1¼ inch (supplied)

- #16 or #18 AWG wire (see “Wire Size and Length” on page 5–11)
- Xantrex network cables or equivalent (Category 5)
- Network terminators (if required)
- Phillips screwdriver
- Wire cutters and wire strippers

## Choosing a Location

The XW Automatic Generator Start should be installed in a location that meets the following requirements:

- |                           |  |
|---------------------------|--|
| <b>Dry</b>                | The unit is intended for use in a dry location. The XW Automatic Generator Start complies with UL458 Marine Supplement drip-test requirements, but the location should be as dry as possible.  |
| <b>Cool</b>               | The XW Automatic Generator Start operates between -4 and 122 °F (-20 and 50 °C).   |
| <b>Safe</b>               | The XW Automatic Generator Start is not ignition protected. Do not install it in areas requiring ignition-protected equipment, such as compartments housing gasoline engines.  |
| <b>Close to generator</b> | Avoid excessive wire lengths and use the recommended wire lengths and sizes (see “Wire Size and Length” on page 5–11). It is more important for the XW Automatic Generator Start to be close to the generator than close to the inverter, although for safety reasons, the XW Automatic Generator Start should not be installed in the same compartment as a gasoline-powered generator. |

## Routing the Connections



### **WARNING: Explosion Hazard**

This equipment is not ignition protected. To prevent fire or explosion, do not install the XW Automatic Generator Start in locations that require ignition-protected equipment. This includes any space containing gasoline-powered machinery, fuel tanks, as well as joints, fittings, or other connections between components of a fuel system.

Follow all relevant instructions exactly before installing or using your XW Automatic Generator Start.



### **WARNING: Shock and Energy Hazards**

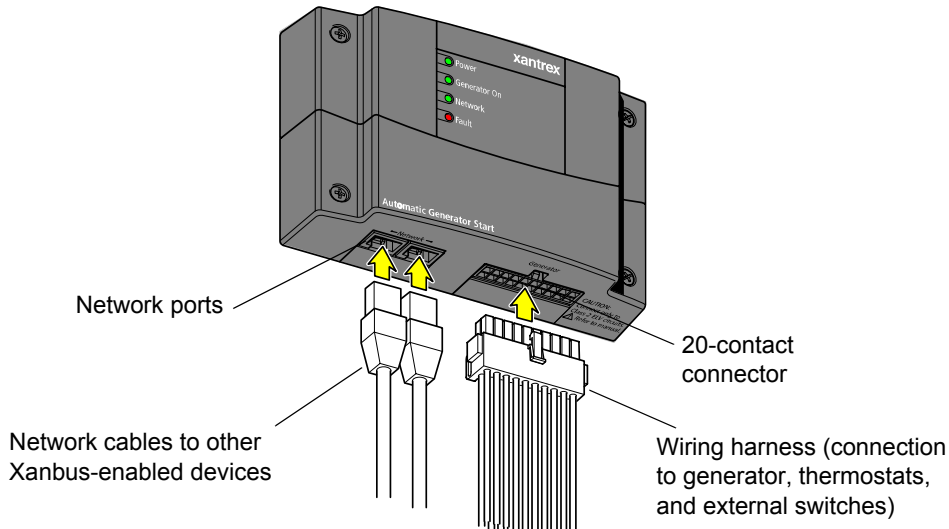
Before making any connections to the generator, ensure that the generator’s starter is disabled and the generator’s start battery is disconnected.

## Connection Types

Because the XW Automatic Generator Start will be part of a Xanbus system, it is necessary to consider how to route two types of connections:

- connections to the generator, thermostats, and other external devices and switches, using the 20-contact connector and wiring harness.
- connections to other Xanbus-enabled devices, using network cables.

For information on designing and installing the network, see the XW Inverter/Charger Operation Guide.



**Figure 5-8** XW Automatic Generator Start External Connections

## Installing the XW Automatic Generator Start

### Installation Overview

Installing the XW Automatic Generator Start involves the following steps:

1. Mounting the unit.
2. Connecting the wiring harness to:
  - the generator (page 5–12)
  - thermostats (optional) (page 5–13)
  - external shutdown switch (optional) (page 5–13)
  - external ON/OFF switch and LED (optional) (page 5–14)
3. Connecting the wiring harness to the 20-contact connector on the XW Automatic Generator Start.
4. Connecting the XW Automatic Generator Start to the XW System Control Panel and other network-enabled devices (page 5–16).

---

**Important:** Because each installation varies according to the location, the type of generator, and the overall complexity of the Xanbus system, these instructions can offer only general guidelines for the many installation options available.

---



### **WARNING: Shock Hazard**

Before installing the XW Automatic Generator Start as part of a pre-existing Xanbus system, put the system in Standby in order to disable the electrical operation of networked devices. See the Automatic Generator Start Owner's Guide for instructions on putting the System in Standby.

---

## Mounting the Unit

The XW Automatic Generator Start is to be mounted vertically on a wall with the connectors facing downwards.

### To mount the XW Automatic Generator Start:

1. Hold the unit flush and square against the wall, panel, or horizontal surface.
  - If the mounting surface requires pre-drill holes for the screws, use the supplied mounting template to mark, then drill, four holes.
2. With a Phillips screwdriver and the supplied #6 screws, secure each corner of the XW Automatic Generator Start to the mounting surface.

## Wiring to the 20-contact Connector



### CAUTION: Shock Hazard

All installation wiring should be performed by a qualified installer or electrician.



### WARNING: Fire, Shock, and Energy Hazards

The 20-contact connector is intended for connection to Class 2 ELV (Extra Low Voltage) circuits only. Do not exceed the circuit limitations specified in the following section.

|                     |   |
|---------------------|---|
| ELV Circuits        | ELV (Extra-Low Voltage) circuits have an open-circuit voltage of not more than 30 V <sub>rms</sub> or 42.2 VDC or peak, and are therefore not a shock hazard.   |
| Class 2 Circuits    | As per the US National Electrical Code (NEC) and the Canadian Electrical Code (CEC), available power in Class 2 circuits is limited to 100 VA, usually by current limiting by means of overcurrent protection or series resistance. The current is limited to 5 A for circuits with open-circuit voltage of 20 V, and to $I=100/V_{oc}$ for circuits with open circuit voltage between 20 V and 30 V. |
| Circuit Limitations | The relay contacts in the XW Automatic Generator Start are rated at 5 A maximum and all circuits on the 20-contact connector are rated at 30 V maximum.<br><br>Ensure that all circuits connected to the 20-contact connector obey the following limits:  |

**Table 5-1** Circuit Limitations

| Circuit Parameter  | Circuit Maximum                               |
|--|---|
| Open circuit voltage ( $V_{oc}$ )  | 30 V maximum                                  |
| Overcurrent protection<br>(fuse size for open circuit voltage up to 20 V)        | 5 A maximum                                   |
| Overcurrent protection<br>(fuse size for open circuit voltage from 20 V to 30 V) | 5 A to 3.33 A<br>( $100/V_{oc}$ amps maximum) |

|                |  |
|----------------|--|
| Wiring Harness | Connections to the generator, thermostats, and external ON/OFF switches are made using a wiring harness that plugs into the 20-contact connector (see Figure 5-8). |
|----------------|--|

The wires on the wiring harness can be extended to meet installation requirements. When extending the wire harness, ensure that the extension wires are the same color as the wires on the harness.

**To install the XW Automatic Generator Start using the wiring harness:**

1. Connect each wire on the harness to its intended wire or contact on the generator, thermostats, or external switches.
2. Plug the harness into the connector on the bottom panel of the XW Automatic Generator Start.

Wire Identification

Each wire on the harness is identified by a number and a color. The wire numbers are shown in Figure 5-9 and their colors and functions are described in Table 5-3.

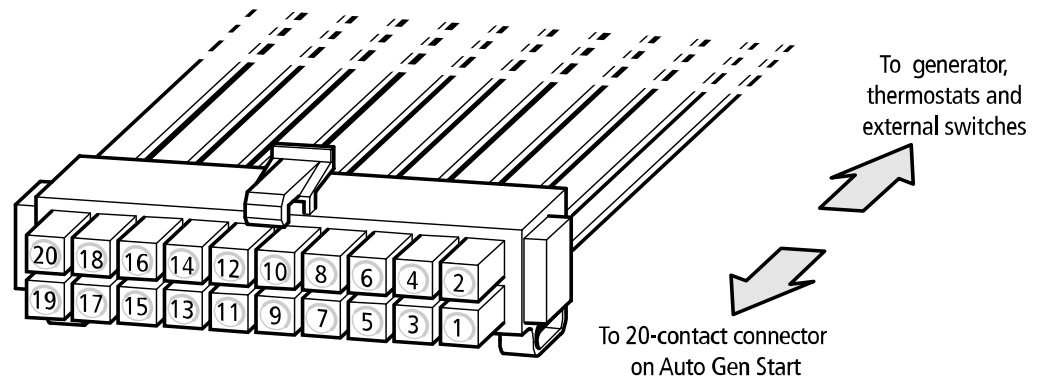
Wire Size and Length

Required wire sizes for the external connections to the wiring harness are:

**Table 5-2** Required Wiring Size Based on Length of Cable

| 0–30 ft. (9 m) | Over 30 ft. (9 m) |
|----------------|-------------------|
| 18 AWG         | 16 AWG            |

When planning the routing for external connections, ensure that wire lengths are sufficient to plug the wiring harness into the XW Automatic Generator Start once all the external connections are complete.



**Figure 5-9** XW Automatic Generator Start Wiring Harness

**Table 5-3** Contact Numbers and Functions

| Wire Number | Function                 | Wiring Harness Wire Color |
|-------------|--------------------------|---------------------------|
| 1           | Thermostat 1 input       | Yellow                    |
| 2           | Thermostat 1 return      | Gray                      |
| 3           | Thermostat 2 input       | Orange                    |
| 4           | Thermostat 2 return      | Gray                      |
| 5           | External shutdown input  | White/Black               |
| 6           | External shutdown return | Gray                      |

**Table 5-3** Contact Numbers and Functions (Continued)

| Wire Number | Function  | Wiring Harness Wire Color |
|-------------|---|---------------------------|
| 7           | External manual on input  | White/Green               |
| 8           | External manual off input   | White/Red                 |
| 9           | External ON/OFF LED Indicator output  | White/Blue                |
| 10          | Constant 12/24 V B+ (battery positive) for External ON/OFF/LED Indicator      | Red                       |
| 11          | External ON/OFF/LED Indicator return (connected internally to wire number 13) | Black                     |
| 12          | Generator run signal (switched B+) sense input                                | Violet                    |
| 13          | Generator run signal (switched B+) sense return (generator battery negative)  | Black                     |
| 14          | Relay 1 (Generator run/stop) Normally open contact                            | Blue                      |
| 15          | Relay 1 (Generator run/stop) Normally closed contact                          | White/Violet              |
| 16          | Relay 1 (Generator run/stop) Common contact                                   | Gray                      |
| 17          | Relay 2 (Generator start) Normally open contact                               | White                     |
| 18          | Relay 2 (Generator start) Common contact                                      | Gray                      |
| 19          | Relay 3 (Preheat/cooldown) Normally open contact                              | Brown                     |
| 20          | Relay 3 (Preheat/cooldown) Common contact                                     | Gray                      |

## Connecting the Generator

To connect the XW Automatic Generator Start to a generator, you must identify the start wiring configuration of the generator you want to use. Generators must be auto-start capable, and generators equipped with remote operation connections are ideal.

If the generator is equipped for remote operation, you must examine the wiring of the remote cable and connector (or read your generator’s documentation, if available) and identify the following wires:

- Ground
- Start
- Stop
- Generator run signal, also known as the Hour Meter or Switched B+ (battery positive)

Wiring requirements

To wire the XW Automatic Generator Start to the generator, you need #16 or #18 AWG wire connected between contacts 12 to 20 on the wiring harness. How many of these wires you connect and in which combination depends on your generator type.

Generator types

The XW Automatic Generator Start has 13 preset generator configurations, or “Gen Types” (see the XW Automatic Start Owner’s Guide for details on Generator Types). To ensure that the XW Automatic Generator Start is compatible with your generator’s starting circuitry, you must select your type of generator from the XW Automatic Generator Start menu on the XW System Control Panel after completing the installation.



---

**Important:** You can only change GenType after you have put the system or the XW Automatic Generator Start into Standby mode. See the XW Inverter/Charger Operation Guide for instructions on putting the system in Standby Mode.

---

This section describes the generator configurations and provides diagrams for connecting the wiring harness to the generator's start wiring.

---

**Important:** For an explanation of the terminology used in the following section, refer to Appendix B of the XW Automatic Generator Start Owner's Guide. For more information about XW Automatic Generator Start internal relay activity and timing, see the Automatic Generator Start Owner's Guide.

---

### Connecting the Thermostats (optional)

Wires 1, 2, 3, and 4 on the wiring harness can be connected to two thermostats. Wires 1 (yellow) and 2 (gray) are intended for thermostat 1 and wires 3 (orange) and 4 (gray) are intended for thermostat 2.

**Table 5-4** Wiring for Connecting Thermostats

| Wire Number | Function                     | Wiring Harness Wire Color |
|-------------|------------------------------|---------------------------|
| 1           | Thermostat 1 input (12/24 V) | Yellow                    |
| 2           | Thermostat 1 return (ground) | Gray                      |
| 3           | Thermostat 2 input (12/24 V) | Orange                    |
| 4           | Thermostat 2 return (ground) | Gray                      |

These wires connect to 12-volt/24-volt output signals from the thermostats. The XW Automatic Generator Start will start the generator in response to these signals. Thermostats can not be programmed using the XW Automatic Generator Start.

For specific information about thermostat wiring and where XW Automatic Generator Start connections should be made, please consult your thermostat documentation or contact the thermostat manufacturer.

### Connecting an External Shutdown (optional)

The external shutdown input is a 12-volt/24-volt input used to assure that the XW Automatic Generator Start keeps the generator off under conditions that may be potentially hazardous. Wire 5 (white/black) and 6 (gray) on the wiring harness are intended for an external switch or sensor (such as a moisture detector, carbon monoxide detector or coach running signal) that produces an active high 12-volt or 24-volt output.

**Table 5-5** Wiring for Connecting an External Shutdown

| Wire number | Function                          | Wiring Harness Wire Color |
|-------------|-----------------------------------|---------------------------|
| 5           | External shutdown input (12/24 V) | White/Black               |
| 6           | External shutdown return (ground) | Gray                      |

## Connecting an External Manual ON/OFF Switch (optional)

The external manual ON/OFF inputs (wires 7 and 8 on the wiring harness) are intended for wiring to one or more remote ON/OFF switches for starting and stopping the generator manually. The other contact of the switch should be connected to ground. In order for the XW Automatic Generator Start to be able to detect these switches, wire the positive of the generator battery to the constant 12-volt/24-volt generator battery positive (wire 10 on the XW Automatic Generator Start wiring harness). See Figure 5-7.

If the generator battery does not have the required voltage, any 12-volt or 24-volt power source will suit this purpose. If an alternate power source is used, the negative of the power source must be connect to the other contact of the switch.



### CAUTION: Equipment Damage

Do not connect the XW Automatic Generator Start to a 48-volt battery bank. The XW Automatic Generator Start is limited to a 30V open-circuit maximum by its regulatory approval and cannot be connected to a 48-volt power source. Furthermore, tapping 12-volts or 24-volts from a 48-volt battery bank will unevenly wear out the batteries and shortens the battery bank life.

**Table 5-6** Wiring for Connecting an External Manual ON/OFF Switch

| Wire Number | Function  | Wiring Harness Wire Color |
|-------------|---|---------------------------|
| 7           | External manual on input                              | White/Green               |
| 8           | External manual off input                             | White/Red                 |
| 9           | External On/Off LED Indicator output                  | White/Blue                |
| 10          | Constant 12/24 V B+ for External On/Off/LED Indicator | Red                       |
| 11          | External On/Off/LED Indicator return                  | Black                     |

Multiple control panels or simple contact closures can be wired to the external manual ON/OFF inputs. The XW Automatic Generator Start detects if any of the contacts close and will change its operating mode to External Manual On or External Manual Off (for more information, see the XW Automatic Generator Start Owner's Guide). The XW Automatic Generator Start turns the generator on or off according to these inputs and the resulting operating mode change.

The External Manual On and External Manual Off states are not affected by maximum generator run time. See the XW Automatic Generator Start Owner's Guide for additional information.

### Connecting an External ON/OFF LED

Wires 9 (White/Blue) and 11 (Black) on the wiring harness can be connected to an LED or other light to accompany a remote external ON/OFF switch. This light turns on when the generator run signal is active to visually indicate that the generator is running.

**Important:** With some generators, the generator run signal becomes active during the preheat stage, before the generator is actually running. In this case, the external ON/OFF LED (and the Generator On light on the XW Automatic Generator Start) will turn on during the preheat stage and remain on when the generator is running. For some generators, these lights will also remain on for a period of time after the generator has stopped.

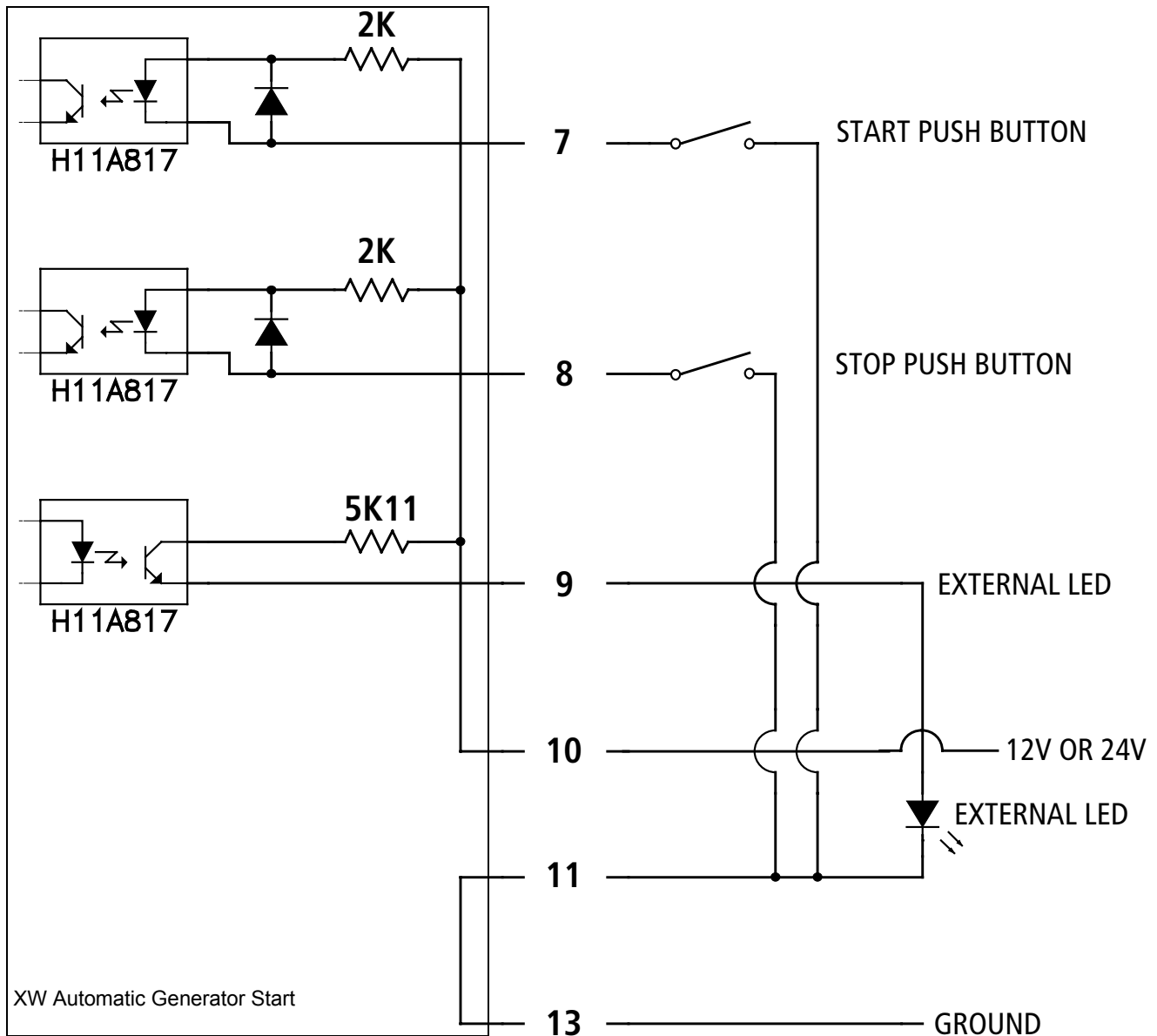


Figure 5-10 External On/Off Switch and LED Wiring Diagram

## Connecting the Wiring Harness to the XW Automatic Generator Start

After all the external connections have been wired to the wiring harness, the connector on the wiring harness must be plugged into the 20-contact connector on the XW Automatic Generator Start.

### To connect the wiring harness to the XW Automatic Generator Start:

- ◆ With the click-tab on the wiring harness connector on top (away from the mounting surface), insert the wiring harness connector into the 20-contact connector on the XW Automatic Generator Start until the tab clicks into place.

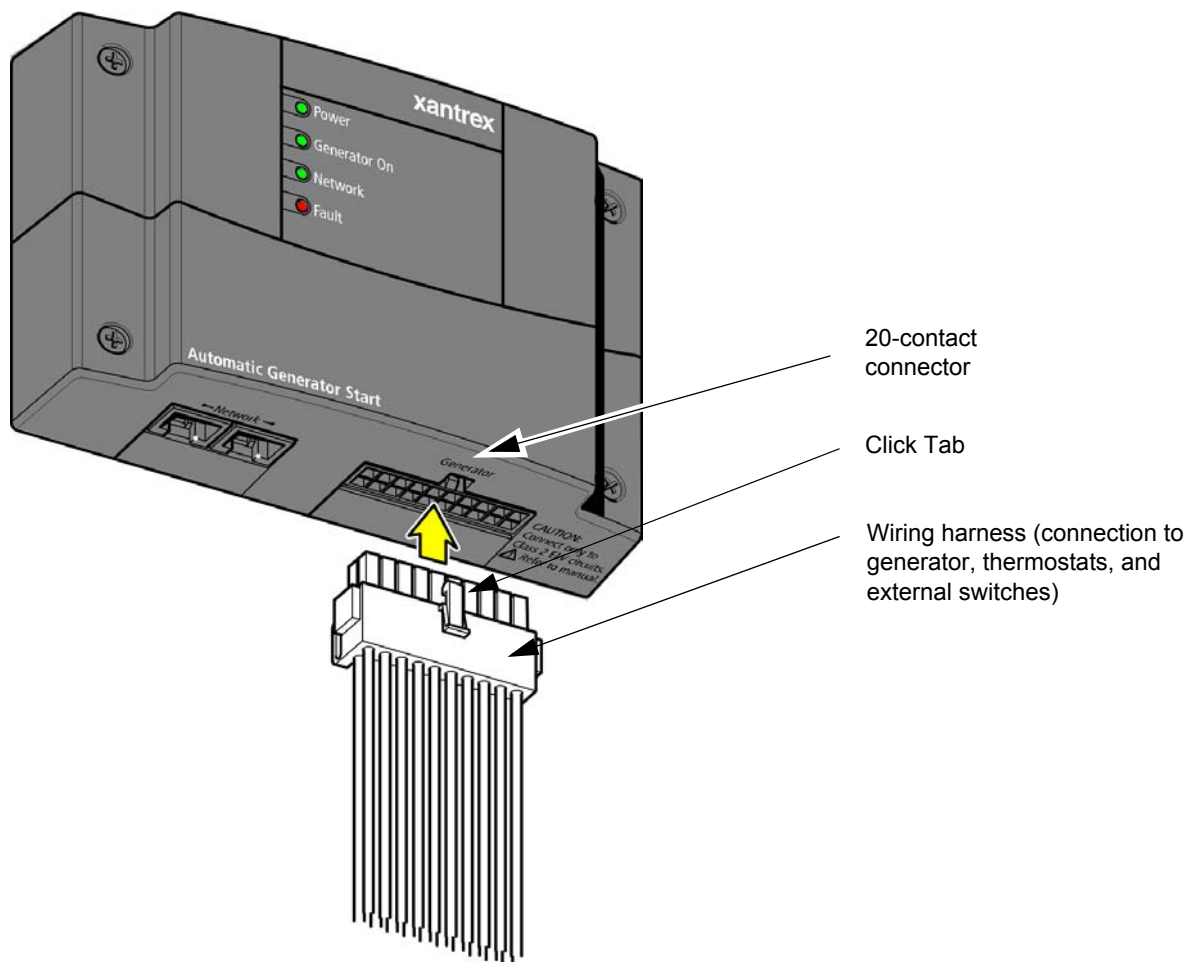


Figure 5-11 XW Automatic Generator Start External Connections

## Connecting the XW Automatic Generator Start to the Xanbus Network



### CAUTION: Equipment Damage

Connect only to other Xanbus-enabled devices.

Although the cabling and connectors used in this network system are the same as Ethernet connectors, **this network is not an Ethernet system**. Equipment damage may result from attempting to connect a Xanbus-enabled device to an Ethernet system.

To connect the XW Automatic Generator Start to the Xanbus network, plug a Category 5 network cable into one of the network ports on the bottom panel of the XW Automatic Generator Start. Connect the other end of that same cable to any Xanbus-enabled component that has an available network port. See Figure 5-8 on page 5-9 for the location of the ports on the XW Automatic Generator Start.

If the XW Automatic Generator Start is being installed on an existing Xanbus system, the system must first be put into Standby. See the XW Automatic Generator Start Owner's Guide for instructions on putting the system in Standby.

Depending on the layout of the Xanbus system, the following options are available for the other network connector on the XW Automatic Generator Start:

- A second network cable (in a “daisy-chain” network layout)
- A network terminator (in a “daisy chain” network layout where the XW Automatic Generator Start is the last device at one end of the network)
- Nothing (in a multi-drop backbone layout)

Connect 1 or 2 Category 5 network cables as required by the installation configuration.

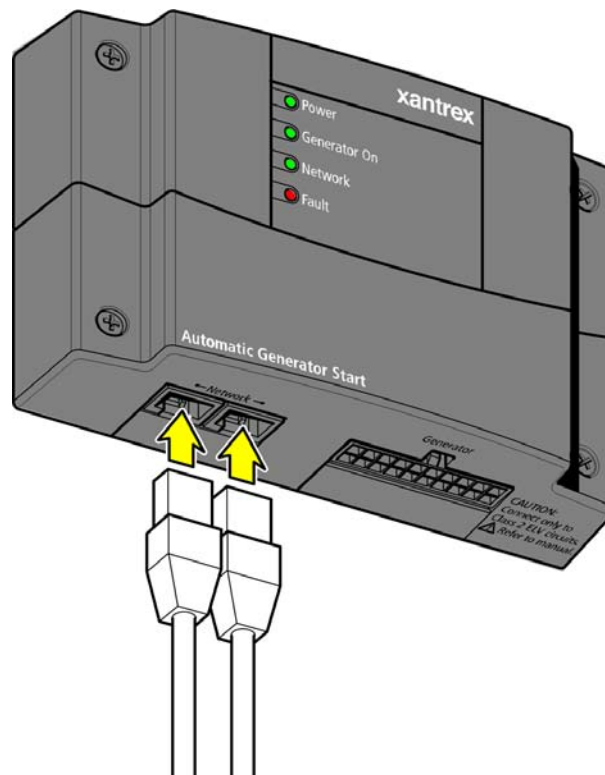


Figure 5-12 Connecting the SCP

## Verifying Power Is Available

When the XW Automatic Generator Start has been installed properly, the Power and Network indicator lights illuminate.

If one or both lights are out, check the network connections and ensure the network power supply is on.

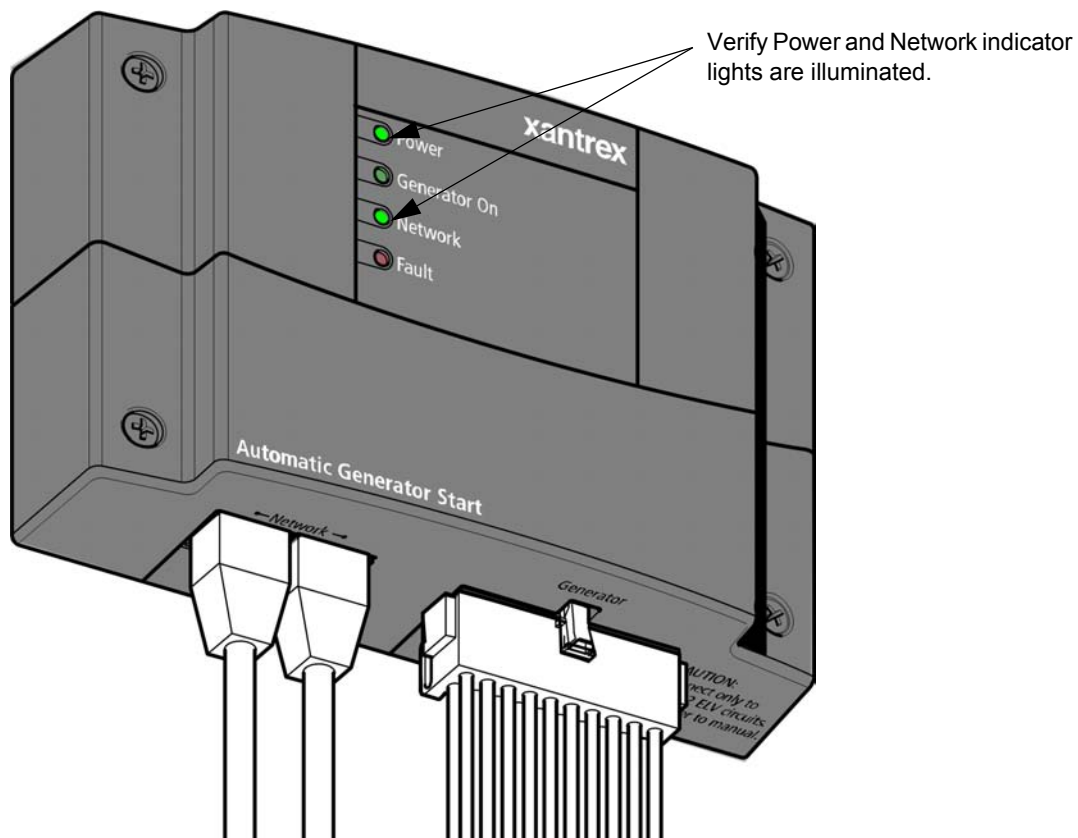


Figure 5-13 Verifying Power is Available

# A

# Specifications

Appendix A, “Specifications” provides the electrical and environmental specifications for the XW Series.

## Electrical Specifications

**Table A-1** XW Power System Electrical Specifications

| Model   | XW6048-120/240-60   | XW4548-120/240-60  | XW4024-120/240-60  |
|---|---|--|--|
| Continuous Output Power   | 6,000 W   | 4,500 W  | 4,000 W  |
| Surge Rating (10 seconds)   | 12,000 W  | 9,000 W  | 8,000 W  |
| Surge Current   | L-n: 105 A <sub>rms</sub> (7 sec)<br>L-L: 52.5 A <sub>rms</sub> (7 sec) | L-n: 75 A <sub>rms</sub> (20 sec)<br>L-L: 40 A <sub>rms</sub> (20 sec) | L-n: 70 A <sub>rms</sub> (7 sec)<br>L-L: 35 A <sub>rms</sub> (7 sec) |
| Waveform  | True Sine Wave  |  |  |
| Idle Consumption—invert mode, no load   | 28 W  | 26 W   | 24 W   |
| Idle Consumption—search mode  | < 8 W   |  |  |
| AC Output Voltage   | L-n: 120 Vac ±3%<br>L-L: 240 Vac ±3%                                    |  |  |
| AC Input voltage range (Bypass/Charge Mode)   | L-n: 80–150 Vac (120 V nominal)<br>L-L: 160–270 Vac (240 V nominal)     |  |  |
| AC Input Current (maximum 75% imbalance between L1-n, L2-n)                                   | L-n: 41.2 A<br>L-L: 27.5 A  | L-n: 30.9 A<br>L-L: 20.6 A   | L-n: 27.5 A<br>L-L: 18.3 A   |
| AC Input Breaker  | 60 A double-pole  |  |  |
| AC Input Frequency Range (Bypass/Charge Mode)   | 55–65 Hz (default)<br>44–70 Hz (allowable)                              |  |  |
| AC1 voltage range—Sell Mode <sup>a</sup><br>(automatically adjusts when entering Sell Mode)   | L-n: 108–130 ±1.5 Vac<br>L-L: 214–260 ±3.0 Vac                          |  |  |
| AC1 Frequency range—Sell Mode <sup>a</sup><br>(automatically adjusts when entering Sell Mode) | 59.4–60.4 ±0.05 Hz  |  |  |
| AC Output Current (maximum 75% imbalance between L1-n, L2-n)                                  | L-n: 37.5 A<br>L-L: 25.0 A  | L-n: 28.1 A<br>L-L: 18.8 A   | L-n: 25.0 A<br>L-L: 16.7 A   |
| AC Output Breaker   | 60 A double-pole  |  |  |
| AC Output Frequency   | 60.0 ±0.1 Hz  |  |  |
| Total Harmonic Distortion   | < 5%  |  |  |
| Automatic Transfer Relay  | 60 A  |  |  |
| Auxiliary Relay Output  | 0–12 Vdc, maximum 250 mA DC   |  |  |
| CEC Weighted Efficiency   | 93.5%   | 93%  | 91%  |
| CEC Power Rating  | 6,000 W   | 4,500 W  | 4,000 W  |
| DC Input Voltage (Nominal)  | 50.4 Vdc  | 50.4 Vdc   | 25.2 Vdc   |
| DC Input Voltage Range  | 44–64 Vdc   | 44–64 Vdc  | 22–32 Vdc  |
| DC Current at Rated Power   | 127 A   | 95 A   | 171 A  |
| Continuous Charge Rate at L-L voltage   | 100 A   | 85 A   | 150 A  |
| Power Factor Corrected Charging   | PF (0.98)   |  |  |

a. This unit or system is provided with fixed trip limits and shall not be aggregated above 30 kW on a single Point of Common Connection



## XW Series Overload Capability

Loads presented to the inverter are seldom constant. Typically, large loads are operated for only short periods of time. In order to provide the maximum utility, Xantrex inverters are allowed to operate at power levels that exceed their continuous power ratings. This graph shows how loads that are larger than the inverter can sustain continuously can be operated for useful periods of time.

The length of time that the inverter can operate at high power is limited by temperature. When large loads are run, the inverter's temperature increases. At the point where more heat is created in the inverter than can be dissipated, its ability to operate becomes time limited.

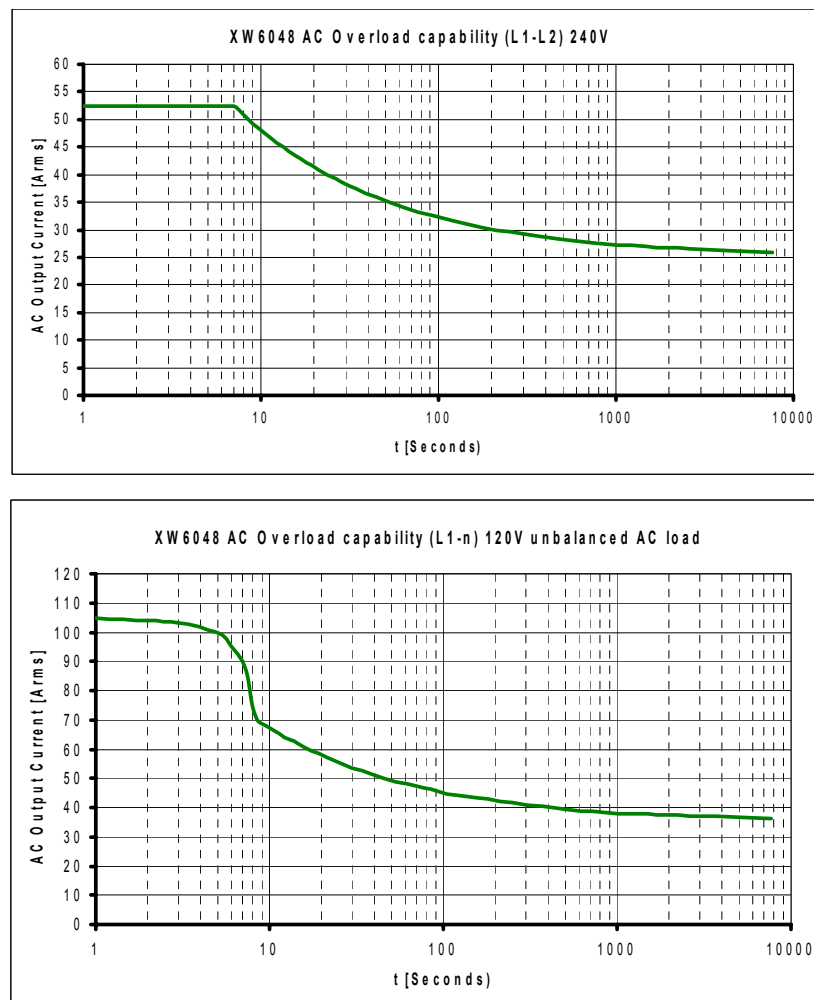


Figure A-1 XW Series AC Overload Capability

## Output Power Versus Ambient Temperature

When the internal temperature of the XW Series exceeds its rated range, the unit reduces its energy output to ensure maximum component ratings are not exceeded.

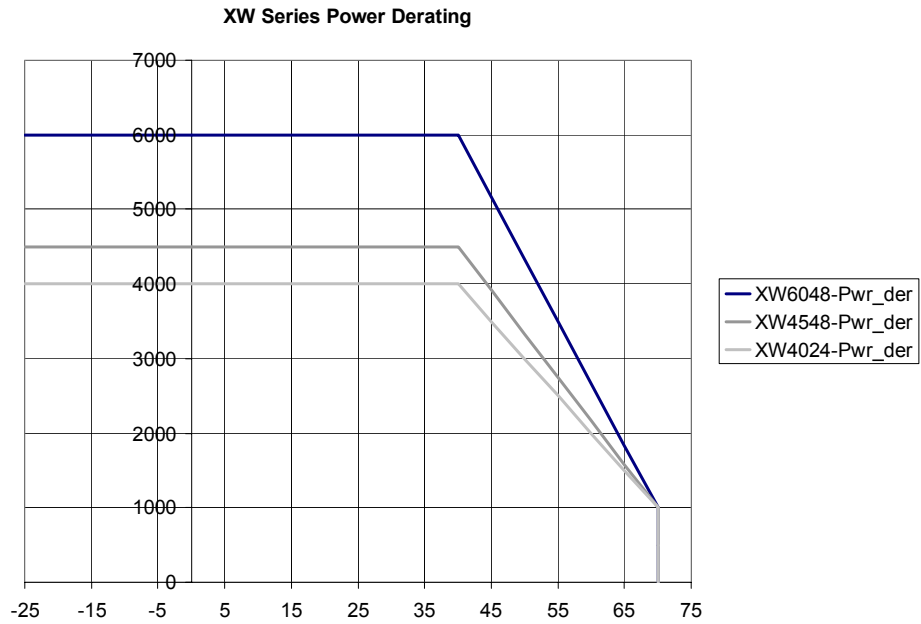
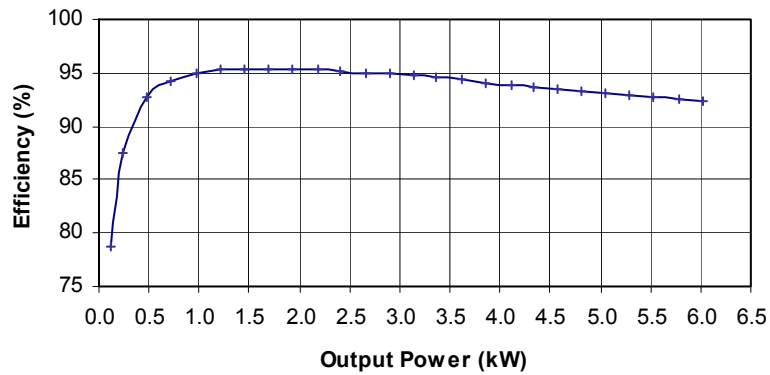


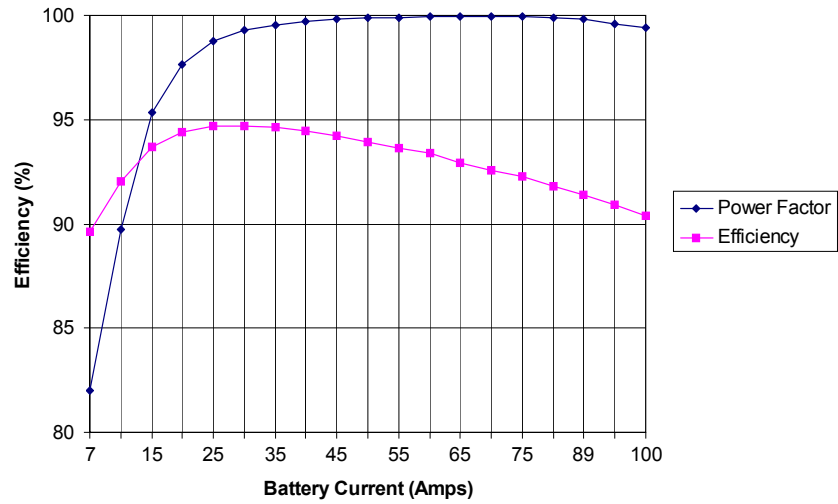
Figure A-2 Output Power Versus Ambient Temperature

## XW Series Efficiency

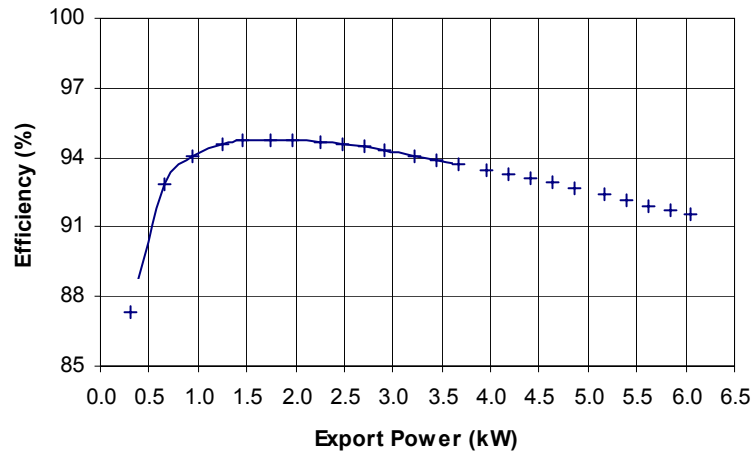
### Inverting Efficiency (Typical)



### Charging Efficiency (Typical)



### Sell Mode Efficiency (Typical)



## Mechanical Specifications

Table A-2 XW Power System Mechanical Specifications

| Model                        | XW6048-120/240-60   | XW4548-120/240-60 | XW4024-120/240-60 |
|------------------------------|---|-------------------|-------------------|
| Supported Battery Types      | Flooded (default), Gel, AGM, Custom   |                   |                   |
| Battery bank size            | 100–2000 Ah   |                   |                   |
| Non Volatile Memory          | Yes   |                   |                   |
| Display Panel                | Status LEDs indicate AC In status, faults/warnings, equalize mode, battery level.<br>Three-character display indicates output power or charge current, fault/warning codes.<br>On/Off and equalize button |                   |                   |
| Multiple Unit Configurations | Up to 3 parallel units in 120/240 split-phase configuration   |                   |                   |

**Table A-2 XW Power System Mechanical Specifications**

| Model  | XW6048-120/240-60  | XW4548-120/240-60 | XW4024-120/240-60 |
|--|--|-------------------|-------------------|
| System Network                                     | Xanbus (publish-subscribe network, no need for hubs or special cards)          |                   |                   |
| Emissions  | FCC Class B  |                   |                   |
| Regulatory approvals                               | UL 1741 1st Edition: 2005 Version, CSA 107.1-01                                |                   |                   |
| Enclosure Type                                     | NEMA Type 1 - Indoor (sensitive electronic components sealed inside enclosure) |                   |                   |
| Rated Temperature Range (meets all specifications) | 32–104 °F (0–40 °C)  |                   |                   |
| Operational Temperature Range                      | -13–158 °F (-25–70 °C)   |                   |                   |
| Storage Temperature Range                          | -40–185 °F (-40–85 °C)   |                   |                   |
| Inverter Dimensions (H × W × D)                    | 23 × 16 × 9" (580 × 410 × 230 mm)  |                   |                   |
| Shipping Dimensions                                | 28 x 22 ¼ x 10½" (711 x 565 x 267 mm)  |                   |                   |
| XW Power Distribution Panel Dimensions (H × W × D) | 30 × 16 × 8 ¼" (761 × 406 × 210 mm)<br>Depth from the wall = 8 ¾" (223 mm)     |                   |                   |
| XW Power Distribution Panel Shipping Dimensions    | 36 x 21 ¼ x 13" (914 x 533 x 330 mm)   |                   |                   |
| Inverter Weight                                    | 125 lb (57 kg)   | 115 lb (52 kg)    | 115 lb (52 kg)    |
| Shipping Weight                                    | 132 lb (60 kg)   | 122 lb (55 kg)    | 122 lb (55 kg)    |

## Accessories

| Accessory   | Part Number   |
|---|---|
| Power Distribution Panel                          | 865-1015  |
| Conduit Box                                       | 865-1025  |
| Inverter #2 Connection Kit                        | 865-1020  |
| XW-MPPT60-150 Solar Charge Controller             | 865-1030  |
| XW System Control Panel (System Control Panel II) | 865-1050  |
| XW Automatic Generator Start                      | 865-1060  |
| Network cables                                    | 3 ft (0.9 m): 809-0935<br>5 ft (1.5 m): 809-0936<br>7 ft (2.0 m): 809-0937<br>10 ft (3.0 m): 809-0938<br>14 ft (4.3 m): 809-0939<br>25 ft (7.6 m): 809-0940<br>50 ft (15.2 m): 809-0941<br>75 ft (22.9 m): 809-0942 |
| Network terminators                               | Male (2 per pack): 809-0901<br>Female (2 per pack): 809-0905  |

# B

## Wiring Diagrams

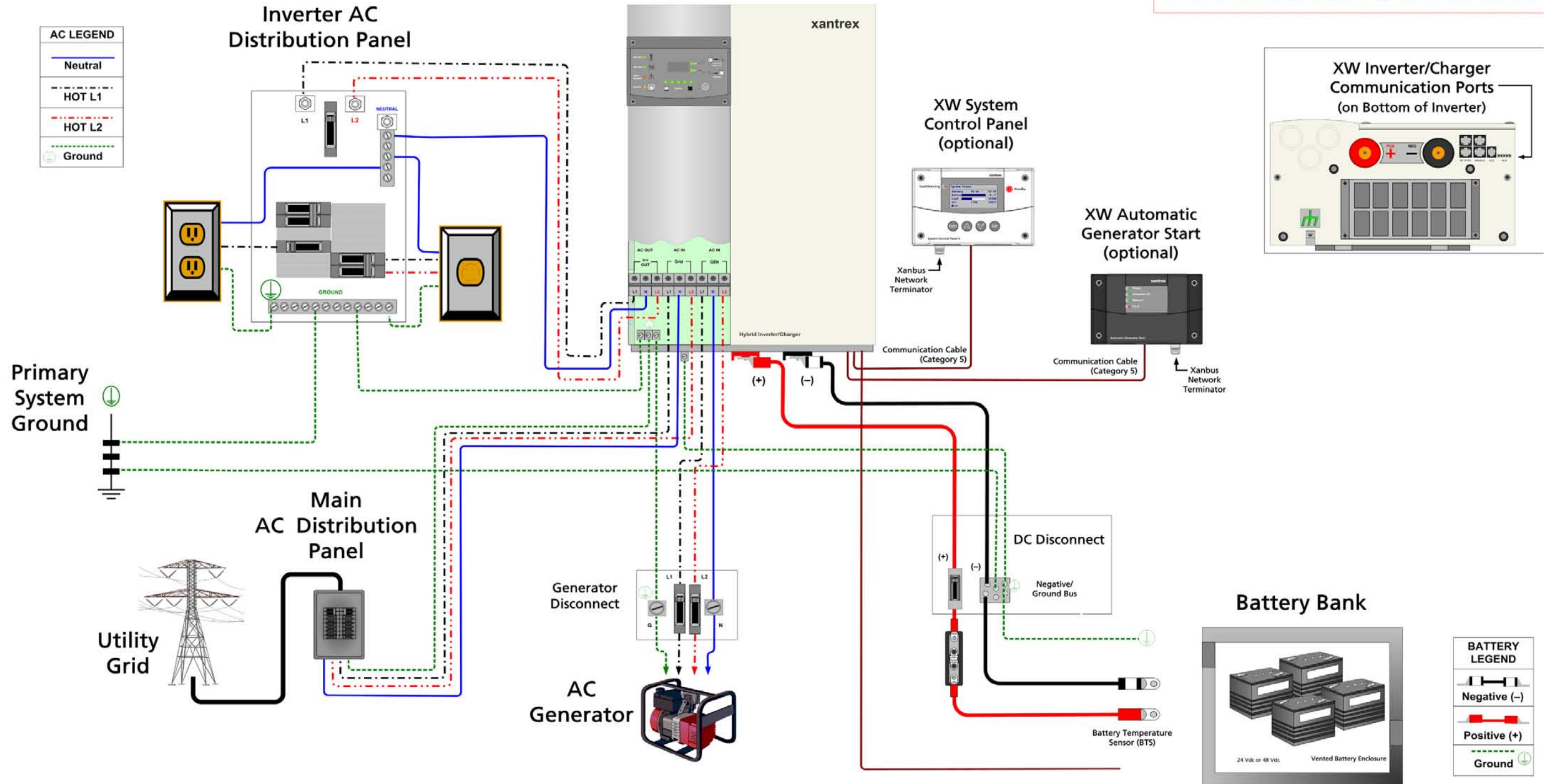
Appendix B, “Wiring Diagrams” illustrate the most basic configurations and are for reference only. Specific installations may require additional equipment to meet national or local electric codes. Ensure all safety requirements are strictly followed.

| <b>For.....</b>   | <b>See....</b> |
|---|----------------|
| “Single-Inverter System (Backup only)”                    | page B-3       |
| “Single-Inverter System Renewable Energy (Solar)”         | page B-4       |
| “Single-Inverter System Renewable Energy (Wind or Hydro)” | page B-5       |
| “Dual-Inverter System Renewable Energy (Solar)”           | page B-6       |
| “Dual-Inverter System Renewable Energy (Wind or Hydro)”   | page B-7       |



# Single-Inverter System (Backup only)

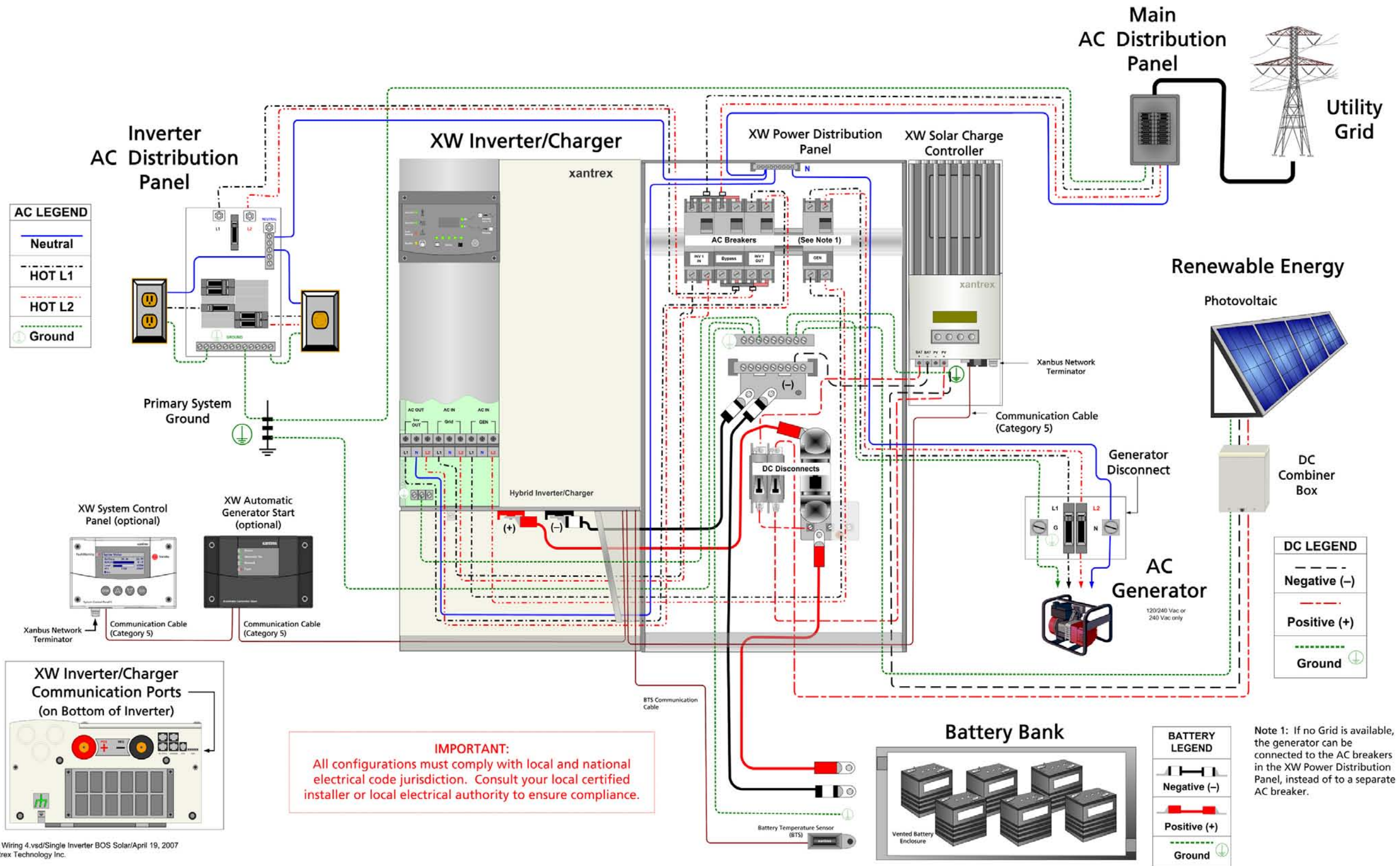
**IMPORTANT:**  
All configurations must comply with local and national electrical code jurisdiction. Consult your local certified installer or local electrical authority to ensure compliance.



\_Addendum Wiring 4.vsd/Single Inverter/April 19, 2007  
© 2007 Xantrex Technology Inc.

Figure B-1 Single-Inverter System (Backup only)

# Single-Inverter System Renewable Energy (Solar)



\_Addendum Wiring 4.vsd/Single Inverter BOS Solar/April 19, 2007  
© 2007 Xantrex Technology Inc.

Figure B-2 Single-Inverter System Renewable Energy (Solar)



# Single-Inverter System Renewable Energy (Wind or Hydro)

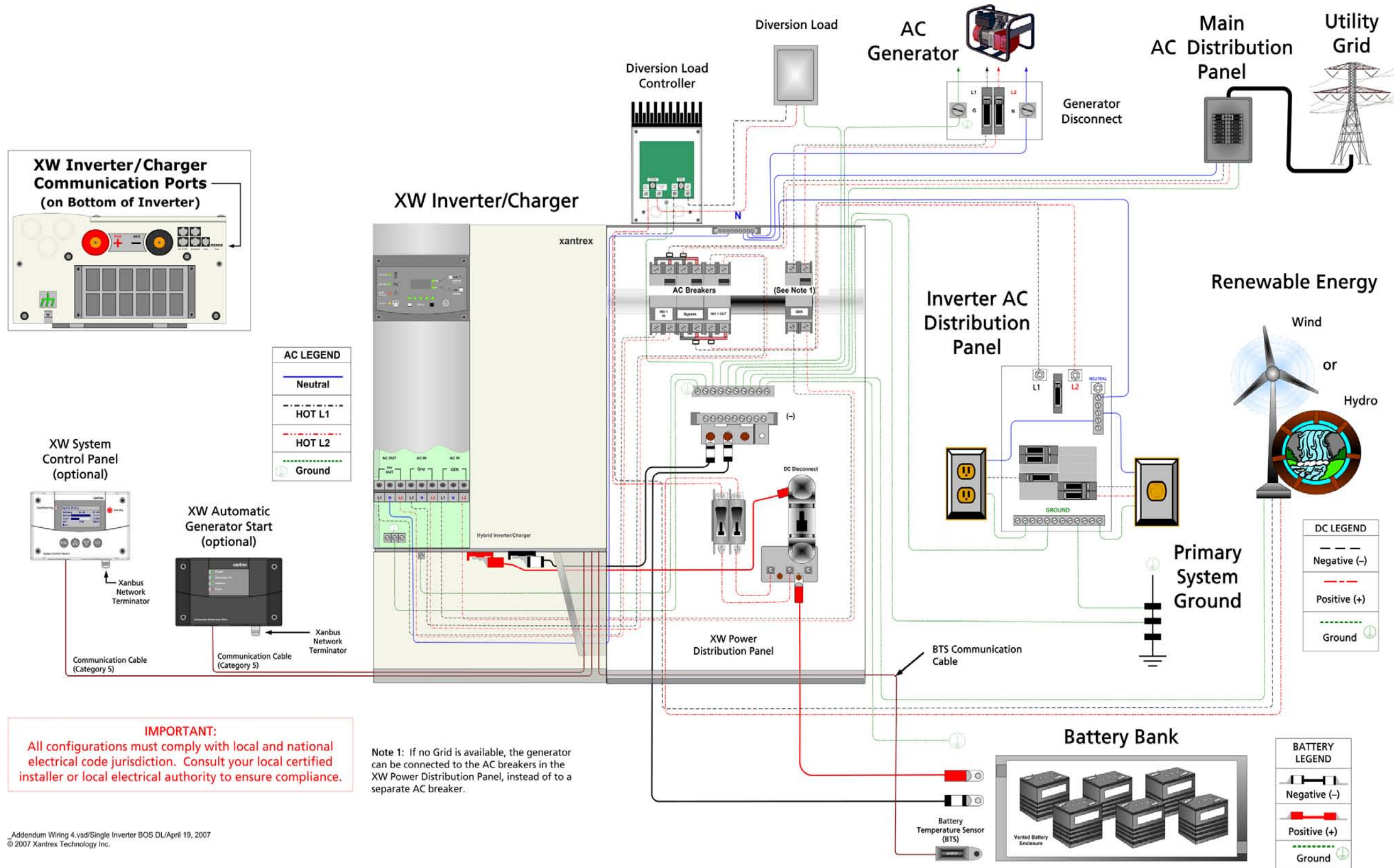
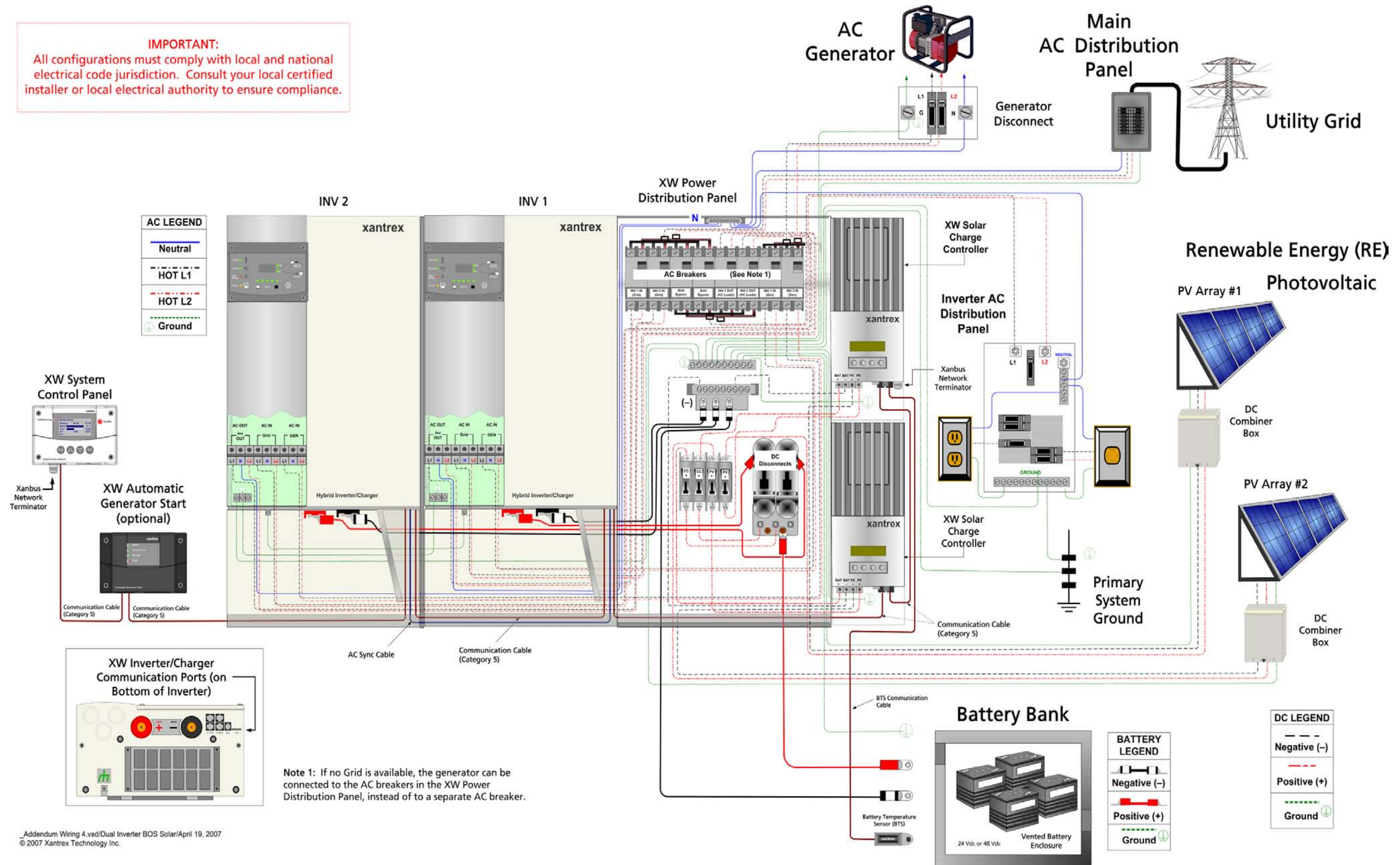


Figure B-3 Single-Inverter System Renewable Energy (Wind or Hydro)

# Dual-Inverter System Renewable Energy (Solar)

**IMPORTANT:**  
All configurations must comply with local and national electrical code jurisdiction. Consult your local certified installer or local electrical authority to ensure compliance.



\_Addendum Wiring 4.vsd/Dual Inverter BOS Solar/April 19, 2007  
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Figure B-4 Dual-Inverter System Renewable Energy (Solar)

# Dual-Inverter System Renewable Energy (Wind or Hydro)

**IMPORTANT:**  
All configurations must comply with local and national electrical code jurisdiction. Consult your local certified installer or local electrical authority to ensure compliance.

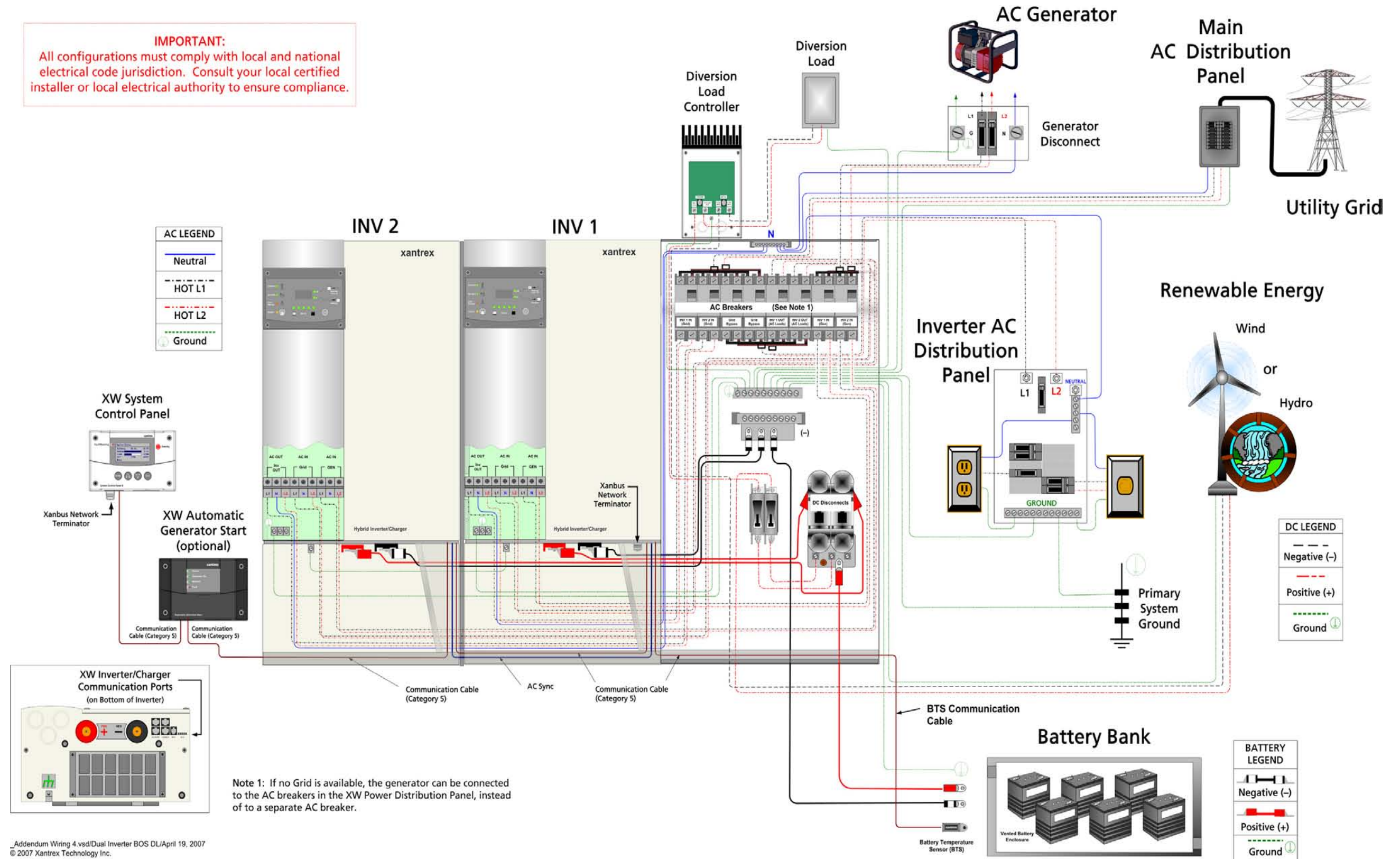


Figure B-5 Dual-Inverter System Renewable Energy (Wind or Hydro)



# C

## **Alternate System Configurations**

Appendix C, “Alternate System Configurations” provides wiring diagrams for inverter/charger installations that do not require use of the power distribution panel and the XW Conduit Box.

# DC Grounding for Single-Inverter Systems

See Table 2-4, “Torque Values for AC Wiring (AC Terminals and Ground Bar),” on page 10.

See Table 2-5, “Torque Values for the Chassis Ground Lug,” on page 10.

See Table 2-6, “Torque Values for the Inverter Battery Terminals,” on page 10.

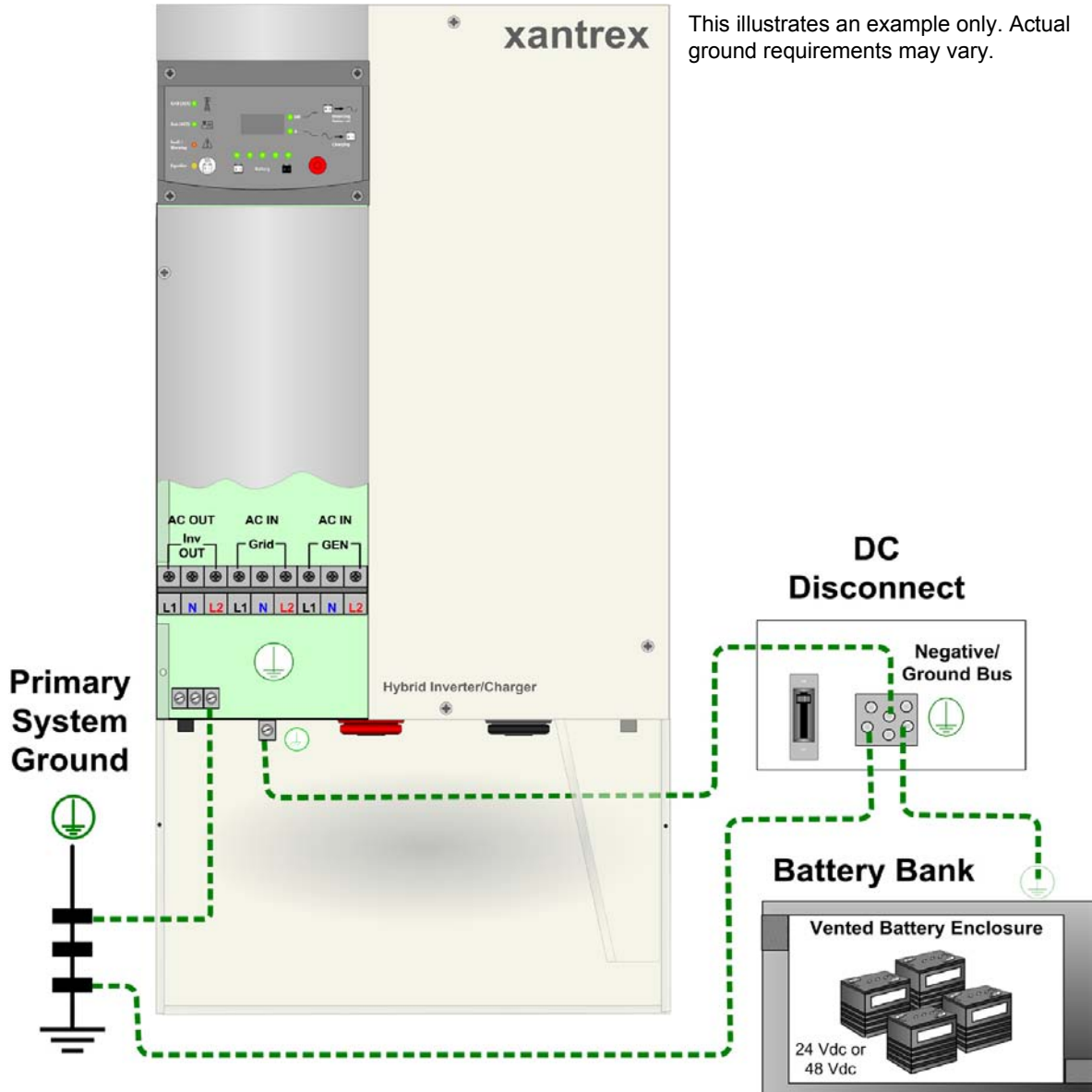
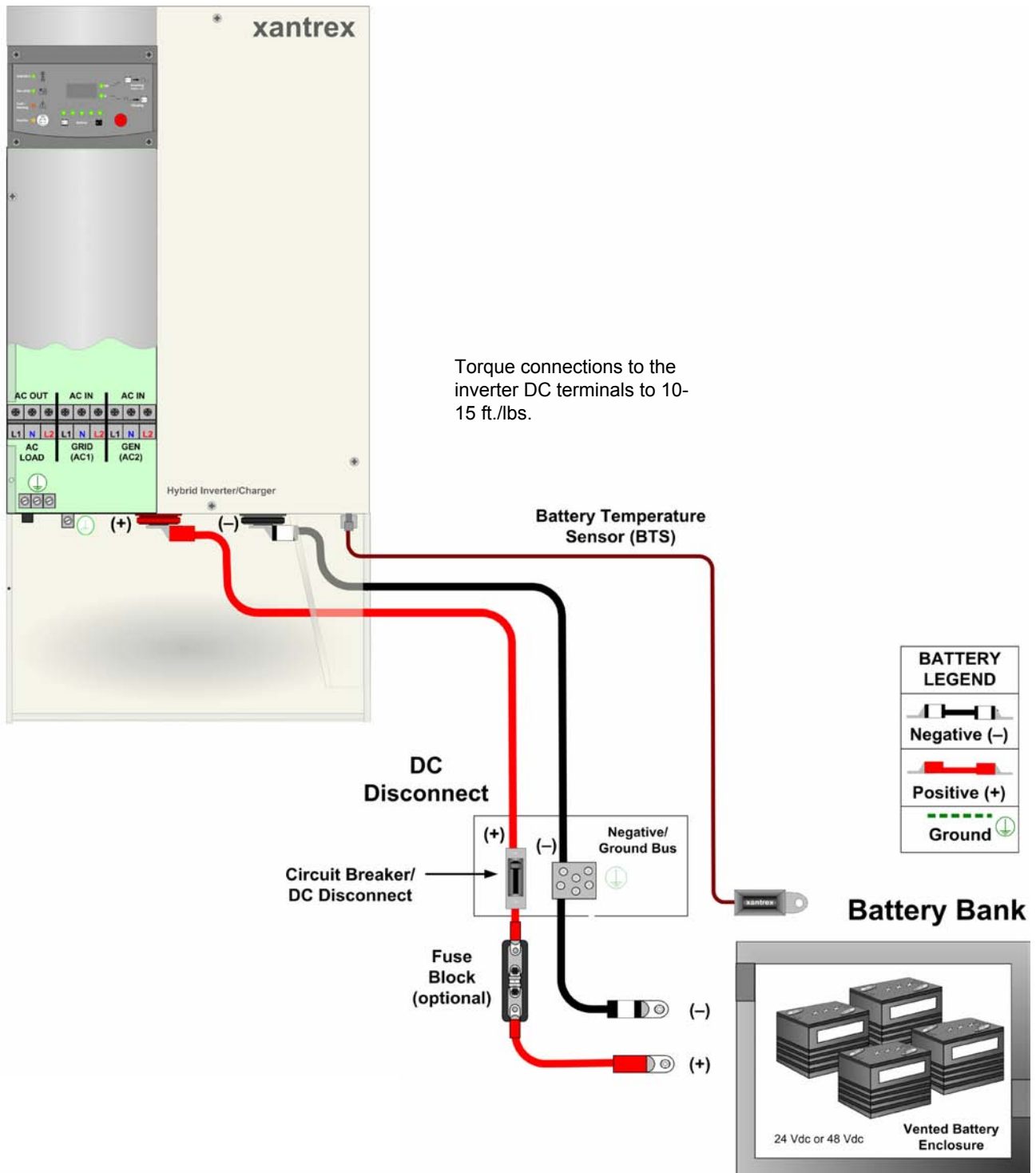


Figure C-1 DC Grounding for an Inverter only

# Battery Connections for Single Inverter Systems

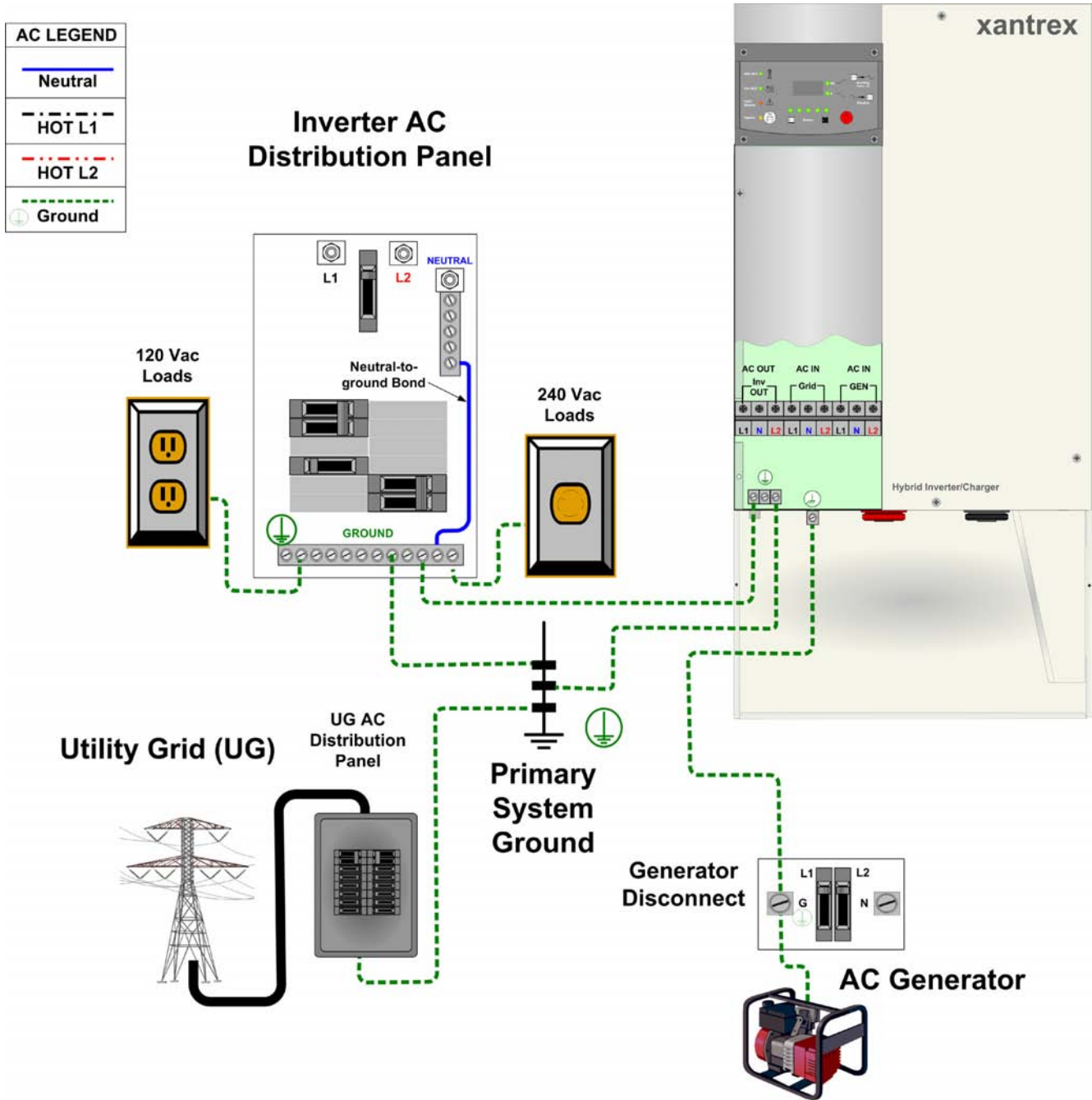


Torque connections to the battery terminals per battery manufacturer's recommendations.

This illustrates an example only. Actual cable requirements may vary.

**Figure C-2** DC Connections to a Single Inverter

# AC Grounding for Single-Inverter Systems



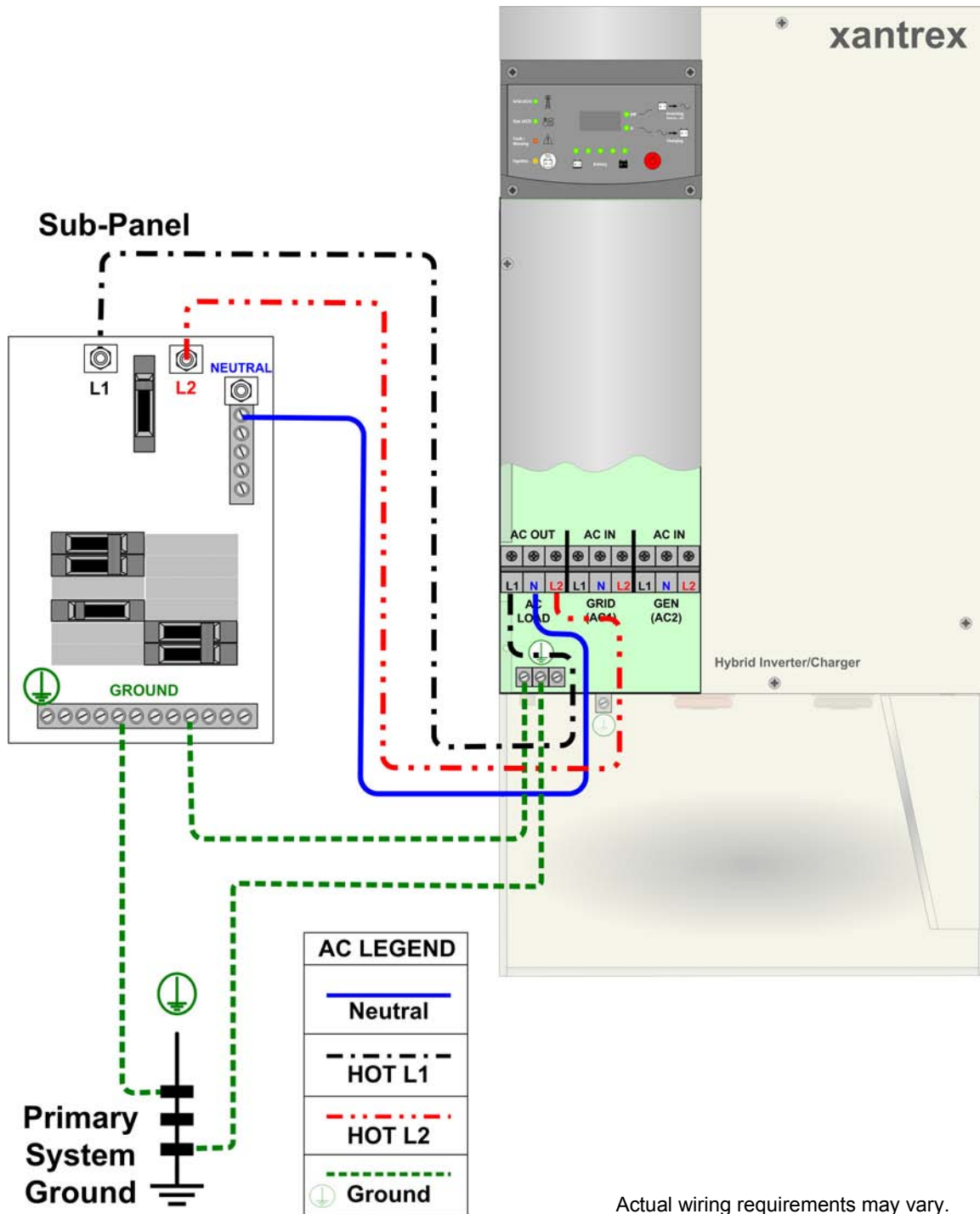
Grounding.vsd/AC Grounding/December 7, 2006  
 © 2006 Xantrex Technology Inc.

This illustrates an example only. Actual ground requirements may vary.

**Figure C-3** Grounding the AC System



# AC Output Wiring to the Inverter AC Distribution Panel



Actual wiring requirements may vary.

\_AC Wiring (all).vsd/Inverter Panel/December 7, 2006  
© 2006 Xantrex Technology Inc.

**Figure C-4** AC Output Wiring to the Inverter AC Distribution Panel

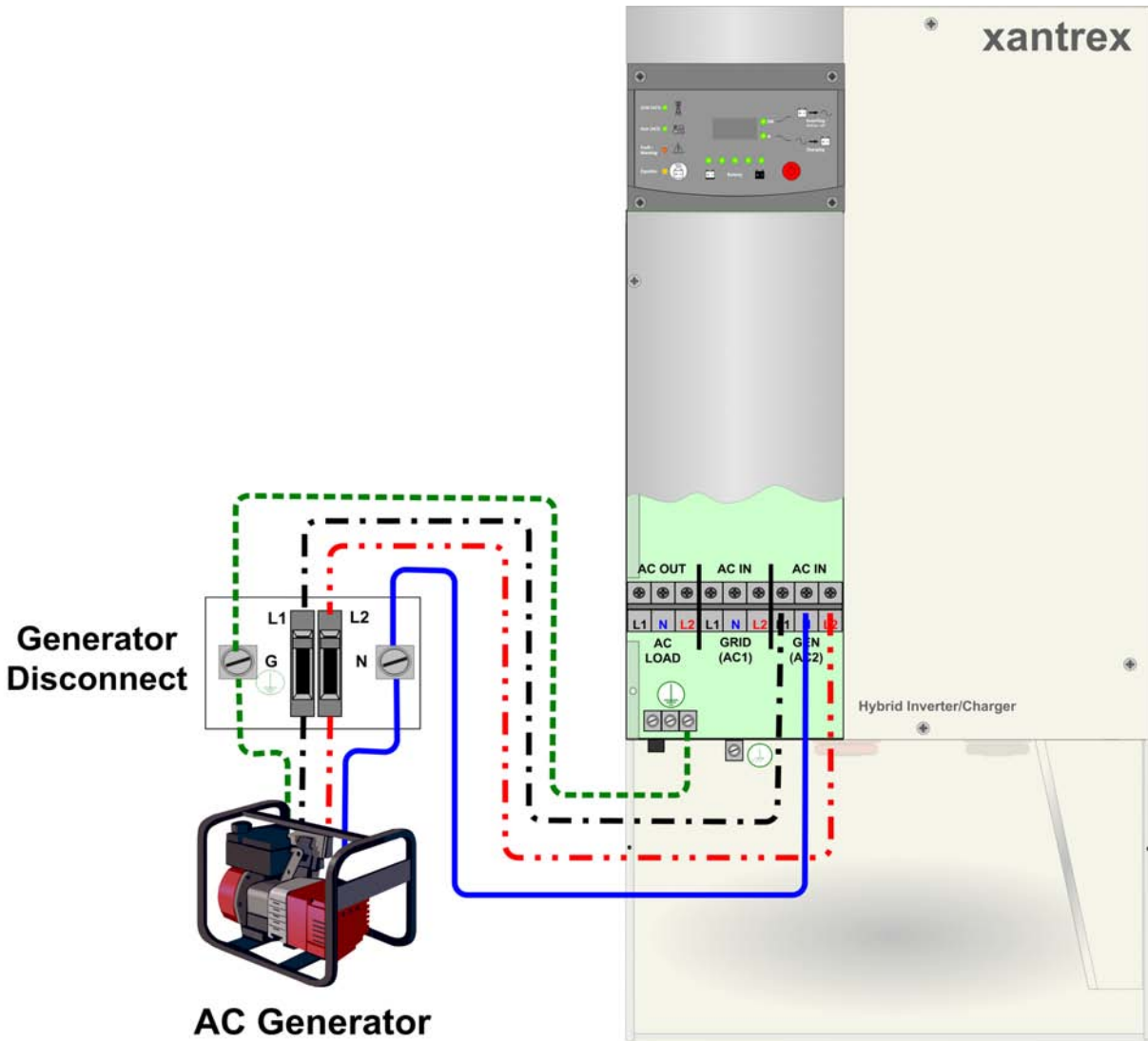
# Generator Wiring to the Inverter



## WARNING: Shock Hazard

Before making any electrical connections, ensure both the AC and DC disconnect devices are in the OPEN (disconnect) position.

Important: If the load is too big for the inverter to operate from battery power, do not install the load in the inverter powered electrical panel.



\_AC Wiring (all).vsd/Generator Wiring/December 7, 2006  
© 2006 Xantrex Technology Inc.

Torque all inverter terminal block connections to 25 inch-pounds.

This illustrates an example only. Actual wiring requirements may vary.

Figure C-5 Generator Wiring directly to the Inverter

# Utility Wiring to the Inverter Input



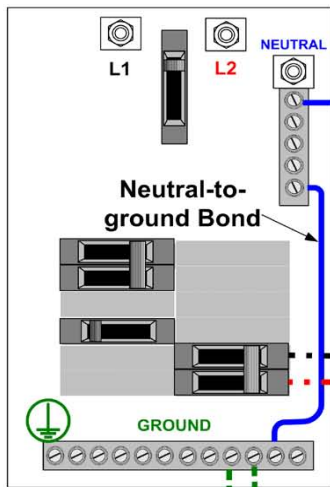
## CAUTION: Damage to Equipment

The inverter's AC LOAD terminals must never be wired to any AC source such as a generator output or utility panel. This will cause severe damage to the inverter which is not covered under warranty.

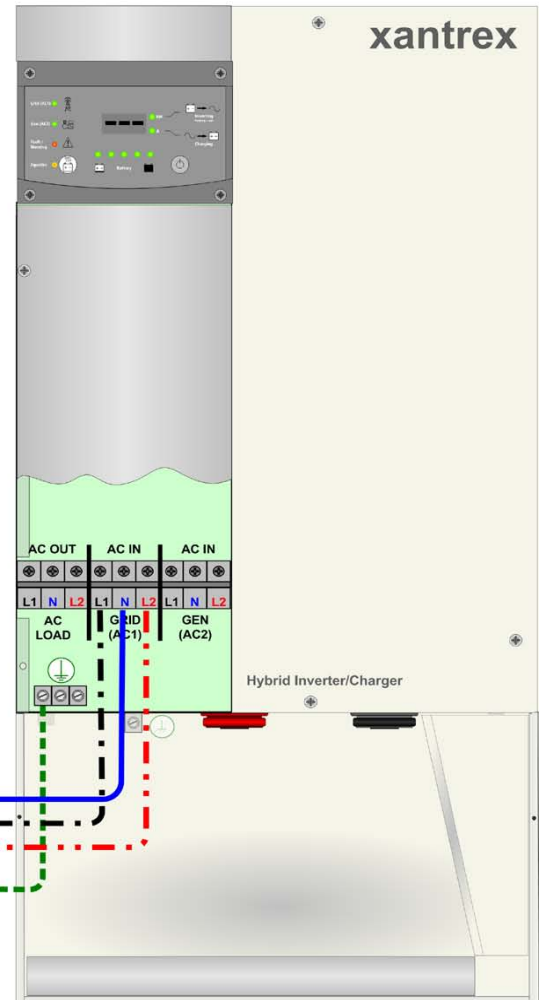
### Utility Grid



### Utility AC Distribution Panel



| AC LEGEND |         |
|-----------|---------|
|           | Neutral |
|           | HOT L1  |
|           | HOT L2  |
|           | Ground  |



\_AC Wiring (all).vsd/Utility Panel/April 23, 2007  
© 2007 Xantrex Technology Inc.

Actual wiring requirements may vary.

Figure C-6 Utility Wiring to the Inverter Input

# Wind or Hydro DC Sources

Actual wiring requirements may vary.

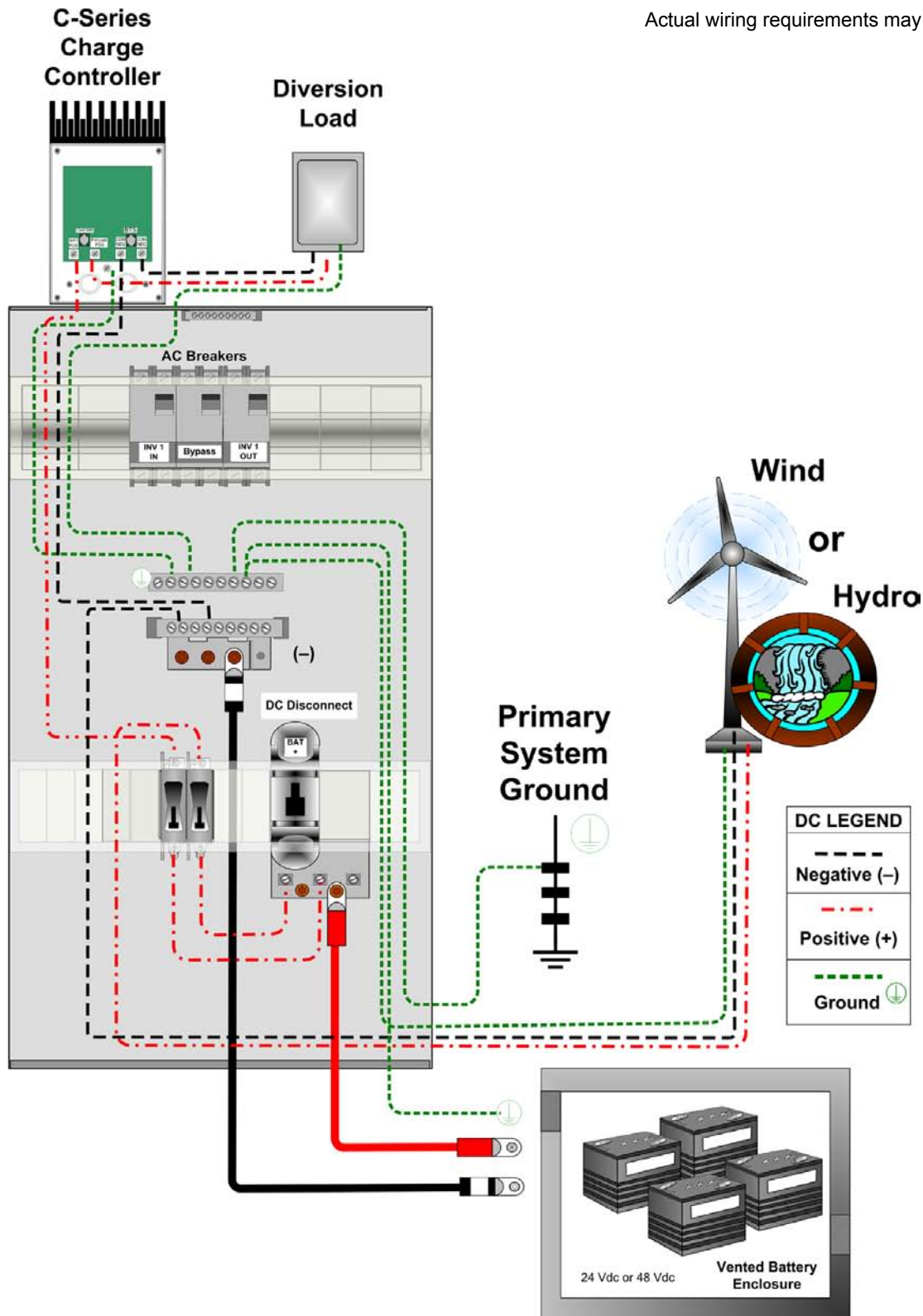


Figure C-7 Connecting Wind or Hydro DC Sources

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